



INSIDE: UPDATED VME (1.1, 31.1, 41, 46) and VXI (3.0) SPECIFICATIONS

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VOLUME 22, NUMBER 3

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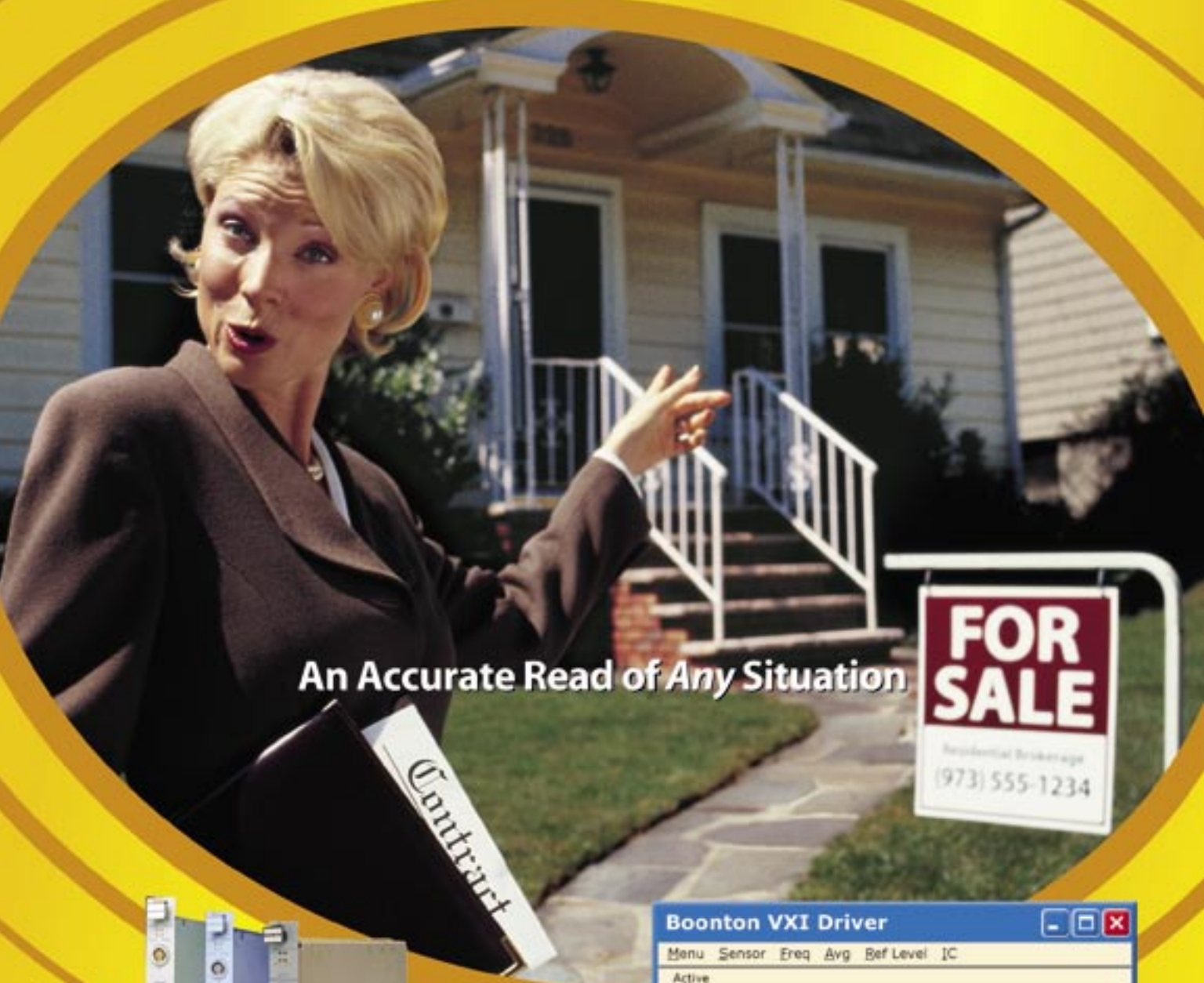
correction

The incorrect Concurrent Technologies SBC was shown as Figure 1 on page 14 of the April issue. The correct SBC can be found at <http://www.gocct.com>.

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**OpenSystems
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sales contacts

VP OF MARKETING & SALES

Patrick Hopper (586-415-6500)
phopper@opensystems-publishing.com

SENIOR ACCOUNT MANAGER

Dennis Doyle (586-415-6500)
ddoyle@opensystems-publishing.com

PRINT/INTERNET MARKETING

Christine Long (586-415-6500)
clong@opensystems-publishing.com

ACCOUNT MANAGER

Tom Varcie (586-415-6500)
tvarcie@opensystems-publishing.com

ADVERTISING/MARKETING

Andrea Stabile (586-415-6500)
astabile@opensystems-publishing.com

FOR REPRINTS & INSERTS

Call 586-415-6500
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ADVERTISING/BUSINESS OFFICE

30233 Jefferson Avenue
St. Clair Shores, MI 48082
Tel: 586-415-6500 • Fax: 586-415-4882

EDITORIAL/PRODUCTION OFFICE

13253 La Montana, Suite 207
Fountain Hills, Arizona 85268
Tel: 480-967-5581 • Fax: 480-837-6466

PUBLISHERS

John Black, Michael Hopper, Wayne Kristoff

SENIOR TECHNICAL EDITOR

Mark David Barrera
mbarrera@opensystems-publishing.com

SENIOR EDITOR

Terri Thorson
tthorson@opensystems-publishing.com

TECHNICAL EDITOR

Chad Lumsden
clumsden@opensystems-publishing.com

ASSOCIATE EDITOR

Anne Fisher
afisher@opensystems-publishing.com

NEW PRODUCTS EDITOR

newproducts@opensystems-publishing.com

VMEbus NEWS EDITOR

clong@opensystems-publishing.com

VXI NEWS EDITOR

clong@opensystems-publishing.com

VICE PRESIDENT OF EDITORIAL

Rosemary Kristoff
rkristoff@opensystems-publishing.com

CONTRIBUTING WRITERS

Ray Alderman, Duncan Young

MANAGING EDITOR

Bonnie Crutcher

ART DIRECTOR

Stephanie Sweet

SENIOR WEB DESIGNER

Konrad Witte

WEB DEVELOPER

Eric Okorie

BUSINESS MANAGER

Karen Layman (586-415-6500)

CIRCULATION/OFFICE MANAGER

Phyllis Thompson
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Editor's Foreword

VMEbus alive and advancing...

Welcome to the Special VITA edition of VMEbus Systems. This issue illustrates the ongoing transformation of the VMEbus and its applications due to the development of the governing VITA specifications.

The VITA News column, by Ray Alderman, is an overview of the following VITA specification efforts:

- V-1.1 – This specification defines a seven-row DIN connector that is 100 percent backward compatible with the existing five- and three-row connectors.
- V-31.1 – This specification defines the addition of a switched-Ethernet network to the present P-0 2mmHM 96-pin connector.
- V-41 – This specification defines the VME Switched Serial (VXS) architecture. This architecture required an update to the 2mmHM connector in order to support fabric interfaces at or above 2.5 GHz.
- V-46 – This specification is primarily for helicopters and avionics at the present time, and it also requires an update to the 2mmHM connector in order to support higher frequencies and pin densities.

The Special VITA feature, by Justin Moll and Michael Munroe of Bustronics, ties the development of the above VITA specifications to new and enhanced VITA applications.


The Special VXI System Specification 3.0 feature, by Scott Kovner of National Instruments, describes how the consortium has further advanced the VXIbus bus while observing VITA standards.

The Scientific Application feature describes the use of a Synergy Microsystems VMEbus SBC to control the Large Binocular Telescope (LBT) in southeastern Arizona. This feature demonstrates how VMEbus boards continue to be designed into state-of-the-art applications.

In whole, this issue clearly illustrates that VMEbus supports today's applications and will continue to support applications far into the future. I hope you will find my debut issue as Sr. Technical Editor of VMEbus Systems to be a useful addition to your library of VMEbus publications. As always, I encourage your comments and suggestions concerning this and future issues. Ω

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FPGAs' impact on next generation sensor digital signal processing

By Duncan Young



Sensors of all types are the eyes, ears, nose, and antennae of the military commander whether they are integrated into a main battle tank, a submarine, a helicopter, or a tactical aircraft. Sensors can be active (laser range-finder, radar, and sonar), or passive (optical, infra-red, sonar, and radio frequency). Individual sensors are used to identify an individual target for the soldier or to identify and track an enemy aircraft. Multiple sensor platforms are used to create a complete air, land, and sea situational picture for the battle commander. Regardless of where in the electromagnetic, visual, sound, or organic spectra the sensor is operating, the received signals are processed digitally and the resulting data is used to construct an interpretable model that allows the system controllers to take the appropriate action.

Dedicated digital signal processing devices have evolved alongside conventional microprocessors for many years. DSP devices were optimized to perform DSP application operations such as Fast Fourier Transforms (FFT) and the rapid transfer of data blocks between multiple devices. But they were very poor general purpose processors. This resulted in the development of hybrid systems consisting of optimized front-end DSP processors, and multiple back-end general purpose processors for system management, communication, and display functions. The gate count and speed of DSP devices developed rapidly, which made the use of an increasing number of DSP devices economically viable. This development, together with improved analog-to-digital speed and conversion accuracy, increased overall system sensitivity and hence the quality of the received data. In addition to increased sensitivity, more channels are being introduced into the sensor systems

for either full 3D coverage in the case of radars and sonars, or for increased coverage of frequency bands for digital radio, signals intelligence, or electronic warfare systems.

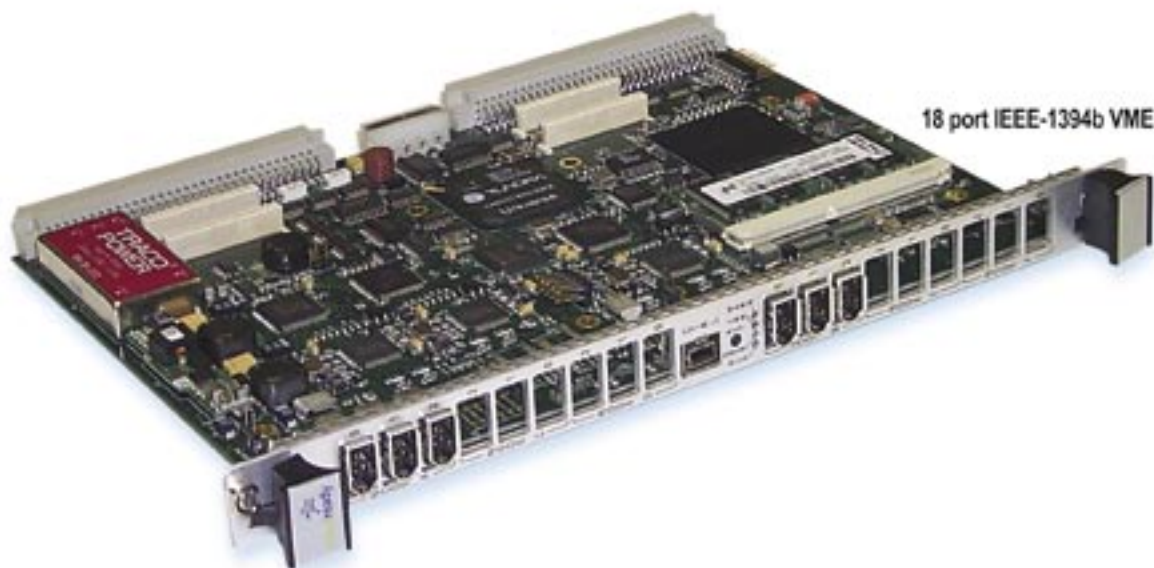
The development of the PowerPC architecture and the AltiVec vector processor by Motorola signaled the convergence of general purpose processing and DSP into a single device. The AltiVec executes floating point FFTs as fast as competing specialized DSP devices, and its PowerPC processor means it can be programmed easily using COTS tools that are currently available from multiple vendors. PowerPC with AltiVec is now the established processor of choice for embedded DSP processing. In VMEbus form it can be used singly (as a SBC), or in higher density dual and quad configurations at the board level. With the addition of suitable switched fabrics for very high speed movement of data between processors, a very large array of processors can be constructed. The array could be mounted in a single VME enclosure, or it could span multiple enclosures for complex systems such as sonar or Synthetic Aperture Radar (SAR).

While these large systems are functionally sound, there is yet another alternative waiting in the wings ready to bring about a return to the hybrid architectures of earlier DSP systems, but with major savings in real estate and overall system cost. In a typical system, the initial front-end filtering and processing (decimation and FFT) would ideally be performed by hardware as these are repetitive established algorithm operations. However, this has been prohibitively expensive for small volume production, and especially prohibitive in the case of multiple channel applications. The advent of RAM-based Field Programmable Gate Arrays (FPGAs) such

as the Xilinx Virtex-II Pro family, with as many as 100,000 logic cells, multipliers, and internal RAM, clocking at 400 MHz+ swings the economic pendulum back towards a front-end hardware solution. Unlike a PowerPC or dedicated DSP processor, an FPGA can be designed to perform multiple operations in parallel on an incoming data stream. Previously, this kind of parallelism required a large number of PowerPCs with the attendant data distribution issues. This issue is easily solved if all of the PowerPCs are located on a single VME card, but the solution is much more complex if the data is spread across a number of cards or racks. Because an individual PowerPC will generally process the data from a sensor source serially and has to rely on switched fabrics for rapid data movement, there is often a need for additional design margins to cope with a reduced level of determinism. FPGAs, being logic-based, operate deterministically and do not require the overhead of frequent synchronization. The use of FPGAs in the critical front-end can result in substantial cost savings on the order of 10x PowerPCs.

An FPGA such as the Virtex-II Pro also has a number of dedicated very high speed I/O channels, for example, RocketIO running at 3 GHz+ to input sensor data at high speed as well as being used to transfer blocks of data from one FPGA to another. In addition, the Virtex-II Pro contains PowerPC cores that could be used for more of the generic processing functions using all the traditional PowerPC development tools for support. The in situ reprogrammability of the FPGA also allows for adaptive algorithms that could, for example, adopt different DSP configurations depending on the operating mode required of a sensor. An example of this might be a multi-mode radar that

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It would then seem that FPGA-based DSP is set to displace the front-ends of the large and complex systems in use today, making VMEbus and COTS products redundant. After all, FPGAs are single devices. Does this point backwards to the reintroduction of proprietary architectures with all their

attendant development, maintenance, upgrade, and sustainability risks? To do so would be to ignore the huge investment legacy in the infrastructure and architecture of VME and all its complementary standards that have made current systems so powerful and reliable, particularly in harsh environments that require conduction cooling and resistance to the effects of shock and excessive vibration. It is also very unlikely that a complete sensor system such as a radar or sonar could be constructed exclusively from FPGAs. There is a significant amount of general purpose processing that still has to be performed on the data streams before any meaningful interpretation or defensive/offensive reaction can be taken,

e.g., targets must be identified and classified, threats evaluated, and weapons/evasive systems deployed. All of these defensive/offensive reactions will be initiated by decision makers who require the use of significant logical and decision-based processing and information sharing applications. These applications are ideal for general purpose, embedded computers such as the PowerPC.

Even though very few of today's DSP systems actually make use of the VMEbus itself, they rely on the wealth of VME standards and the industry's product base for their infrastructure, support, interconnect, packaging, and network fabrics. Often VME is only used for system initialization, self-test, and management using a general purpose SBC in Slot 1 of the chassis, while dedicated I/O, PCI, and switched fabrics are used for the DSP application. New FPGA-based DSP products are now being introduced into this infrastructure and support environment. A 6U VME card can accommodate two or more FPGAs, a large complement of 64-bit and 128-bit DDR and DDRII SRAM, two PMC/XMC sites, a local PowerPC controller, and a pair of switched fabric interconnects. RocketIO ports will be used to connect to the sensor digital data streams, to pass data between the onboard FPGAs, and to provide external links to other FPGA cards. Products are now available from several defense and aerospace-focused vendors who provide complete system-level solutions which connect FPGA front-ends to existing multiple PowerPC processor products via their preferred switched fabrics, e.g., Mercury Computers with Race++ fabric interconnect, and Dy 4 Systems with StarFabric. As an example, the Dy 4 Systems CHAMP-FX DSP board which incorporates two Xilinx Virtex-II Pro FPGAs for digital signal processing is shown in Figure 1.

Interestingly, the introduction of fully supported FPGA-based products for DSP applications might cause a further convergence between hardware and software development engineers. Is an FPGA a piece of hardware or software and to which discipline does it belong during its



Figure 1

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development? The use of development tools and libraries is likely to be the discriminator, with logical and embedded tools to be used by hardware engineers, while graphical/mathematical tools such as MATLAB to be used by software and systems engineers.

The use of proven infrastructure and architecture to incorporate FPGAs into a new or upgraded DSP system is key to implementing a successful and economical solution.

VITA recognized the need to incorporate many of the features required for these new DSP solutions in the development of standards such as VITA 34, 41, and the recently announced VITA 46. VITA 46 will offer radical new capabilities for VME systems deployed in harsh environments with support for multiple switched fabrics, improved I/O connectivity, and the support of Gbit+ signaling rates through the backplane connectors. These connectors can be used for high-end radar, sonar, graphical, and digital radio DSP applications. Applications such as the radar system used on the AWACS aircraft (Figure 2) will employ FPGA-based DSP solutions.



Figure 2

The FPGA has become a key component in the battle to increase the sensitivity and performance of sensor systems while reducing cost, power, and space requirements. As usual, VME and its infrastructure have evolved to remain the ideal platform for implementation thereby encouraging migration from existing systems, and the development of new systems. Ω

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By Ray Alderman



Understanding the new VITA specifications

While it is fun to watch companies strip off their R&D and marketing costs, it is time to take a look at more realistic markets. I have been getting a number of phone calls from users asking about the new VITA specifications (V-31.1, V-41 VXS, V-46, and V-1.1). Each specification has a logical progression, and each specification addresses the varying requirements of an applications niche. In addition, the first two specifications comply with the philosophy VITA has had from the beginning: adopt, adapt, and then create new technologies for VME.



VITA V-31.1

V-31.1 basically adds a switched-Ethernet network to the present P-0 2mmHM 96-pin connector. It has severe limitations in bandwidth (about 1.3 GHz) compared to new connectors on the market, but it will work with 1 GHz Ethernet chips and switches. V31.1 allows users to add 1 GHz Ethernet connections or a 1 GHz Ethernet switched network to the P-0 connector, but still maintain complete backward compatibility to previous VME cards. Many users have tremendous investments in their I/O cards, and this allows those users to technology-insert new technology without throwing out all of their previous hardware and software. That has always been a goal for VITA: to preserve the investments our customers have made while enabling them to adopt and insert newer technologies. It is true that you must change the backplane to accept the new 2mmHM connector in some switch or network configurations, but all of the previous VME cards will function as normal in this new backplane.

VITA V-41

V-41 or VME Switched Serial (VXS) architectures are about multiprocessing and multi-computing. Since the 2mmHM connector is bandwidth challenged, and all of the new fabric interfaces are at or above 2.5 GHz, we had to change the connector to a more advanced version. The VITA Standards Organization (VSO) chose the RT-GIG connector from Tyco and Erni. This new high-speed connector is capable of 2.5 GHz connections and higher frequencies, but it is not backward compatible with the old 2mmHM connector.

With high-speed serial fabrics, you can hook together multiple processors using InfiniBand, Rapid I/O, and eventually PCI-Express and Advanced Switching. Also, you can subdivide 10 GHz Ethernet connections into four channels of 2.5 GHz each with this new capability.

Many users have applications in the supercomputing arena that can take advantage of this new higher-speed architecture, but again, you must change out the backplane to get the fabric networked traces and the new RT-GIG connector. As with V-31.1, all previous VME cards will run fine in the VXS backplane. This continues our efforts to protect user investments in I/O cards and software, but allows them to add new technology in an existing VME system with a minimal amount of disruption and cost. To date, we have seen a lot of application interest for VXS-enabled

systems in medical equipment, signal processing, and simulation. I anticipate that more market segments will develop as VXS-enabled products start flowing into the market from numerous manufacturers. Look at V-41 (VXS) as a supercomputing architecture that can maintain the backward compatibility of legacy I/O domains, but can offer fabric connections to many processors and will allow customers to feed streaming I/O (from sensors and other devices) into a processor network through the backplane. Expect to see V-41 compliant products in the marketplace in the next few months. We have already seen VXS backplane announcements from several vendors.

VITA V-46

At the current time, V-46 is primarily about helicopters and avionics. The 3U cards seem to be generating the most interest at this time. Any 3U card is pin limited with previous generation connectors, and the old 2mmHM connector cannot handle the higher frequencies and pin densities. Again, the VSO Committee chose the RT-GIG connector to get the needed density and bandwidth.

I expect to see V-46 boards in new helicopter electronic systems. The military are dropping new helicopter programs and relying on updating the Longbow, the Apache, and even the UH-1X Huey helicopter platforms from the Vietnam War with new electronics. New avionics platforms are also planned for fighter planes, attack jets, and other airframes. The military want to reduce the weight of the equipment in those platforms, reduce their costs, and increase the effectiveness of those systems. These needs are being integrated into the V-46 specification. There has been a great deal of interest from a number of users and other companies about V-46. We will probably see product demos and announcements by the end of this year, and the specification should be completed about the same time. I expect to see a number of V-46 boards that are Conduction Cooled (CC). That will be a relatively easy task since the original CC specification requirements are easily transferable to the V-46 platforms. As the V-46 market develops, I also anticipate 6U applications especially for shipboard and ground-based applications.

Look at V-46 as a specialized version of V-41, but with some notable differences. In the 3U applications, there is no need for backward compatibility requirements. The V-46 systems will be newly designed systems for avionics, so there is not much legacy to support. Using the RT-GIG connector, you can also

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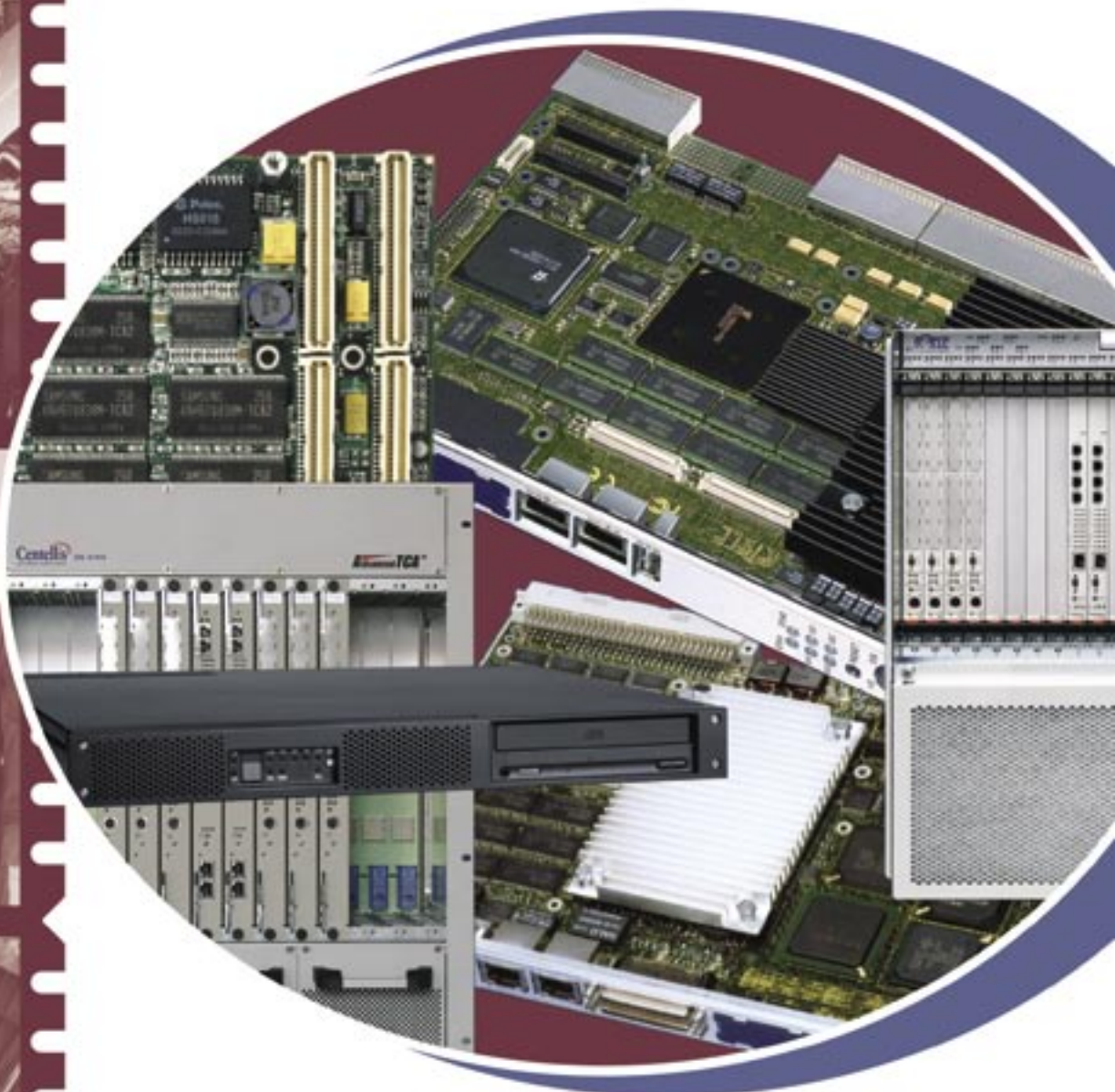


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input high-speed serial connections from sensor systems and other streaming data sources through the backplane, something that is required but not supported in previous VME documents (much of that has been done through the front panel in the past). As a result, V-46 is a new VME paradigm for mechanicals and connectors, but the VMEbus can be resident on the new connector, and compliant V-46 boards can run off the regular VMEbus backplane, or the boards can be linked together with one of the fabrics coming to market.

VITA V-1.1

Finally, there is V-1.1. This standardization effort seeks to define a seven-row DIN connector that is 100 percent backward compatible to the five-row DIN and the original three-row DIN on legacy VME cards. Not every user or application requires fabrics or high-speed connections. Many applications simply want a higher pin density and a lower board density in their systems for discrete I/O lines. V-1.1 seeks to perpetuate the traditional VME requirements in many legacy and new applications.

Contrary to all the hype and rhetoric in the market about serial fabrics completely replacing buses in a matter of months, there are a lot of customers and applications that have no desire to change, and they are not being pressed to change their complete architecture and software. The fabric wars have yet to begin. The software for switch management, load sharing, load monitoring, etc. has yet to be written. It will take at least another five years

before fabric-based computers will be openly adopted. There are some application segments that can obtain benefits from fabrics today, and those are the targets for the V-41, V-46, and V-31.1 specifications. The V-1.1 specification maintains the backward compatibility of legacy boards and applications that will be slow to adopt the new fabric technologies for various reasons.

Contrary to all the hype and rhetoric in the market about serial fabrics completely replacing buses in a matter of months, there are a lot of customers and applications that have no desire to change . . .

Conclusions

So, now you know where all these new specifications fit, what they are supposed to do, and how they are supposed to work. Different markets have different requirements, and this new series of specifications are responding to those customer and market needs. At the same time, these new specifications will attract new markets for VMEbus products that could not be attracted in the past. Each of these new segments has a market potential of hundreds of millions of dollars, depending on the ebb and flow of new semiconductor technology coming down the pike. But V-41 and V-46 have the ability to accommodate whatever the semiconductor companies throw at us in the next four to five years, including 10 GHz connections on a single copper differential pair. Standby for future updates. Ω

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VMEbus TECHNOLOGY

By Hermann Strass



VMEbus technology products and projects

Several unique products were released at CAEN (Italy) including low cost serial interface boards for USB 2.0 (VMEbus card V1718), and two versions of an optical link board (V2718 and V2818) that act as a PCI extension (PCI-to-VME bridge). All three boards are usable without a boot operation. A V2818 board can daisy chain up to eight V2718 boards. The boards are used individually or as part of the chainable optical network. All boards also feature Ethernet, RS-232, a network-interface module, and TTL I/O. Status is shown on the front panel dataway display with LEDs for 32-data and 32-address bits, and LEDs for all of the significant VMEbus control signals. Equivalent APIs are used for Windows and Linux-based environments. Ready-to-use Virtual Instrument software is available for the LabVIEW software suite from National Instruments.

Interface Concept (France) announced an additional VMEbus card in their communications line of products. The ComEth4100 VMEbus board provides up to 10 Ethernet or Gigabit Ethernet ports (10/100/1000Base-T) (see Figure 1).



Figure 1

One port can be equipped with an LX or SX port. The ports are available on the front or rear panel. The board may be used simply as an I/O board or in a VITA 31.1 configuration. A CompactPCI version is also available. The non-blocking Ethernet switch matrix may be used in virtual local area networks applications (IEEE 802.1Q). An optional PowerPC processor can improve performance significantly, if needed. The conduction-cooled VMEbus board version is available for use in ruggedized systems. The low-power board

can be managed and configured locally, by program, or via a web browser.

Radstone Technology (UK and USA) offers a liquid-cooled chassis variant within its Air Transport Rack (ATR) chassis line. The chassis can be connected to an existing cooling system using a variety of coolant liquids, or it can be equipped with its own pump and heat exchanger. The liquid-cooled chassis can remove up to five times the amount of heat compared to forced air cooling. This allows for considerable space reduction.

Business information

Boards & Solutions 2004 was held in Reading, UK in March. The one-day conference and exhibition attracted more than 100 delegates to its conference section where attendees chose from presentations in three parallel tracks. A number of VMEbus manufacturers and resellers from the UK and Continental Europe presented products or applications during the sessions. The next two events in this series will be held on June 23 in Duesseldorf, Germany and on June 30 in Munich, Germany.

The Hannover-Messe 2004 Exhibition and Conference will be held in Hannover, Germany from April 19 to April 24. Close to 6,000 exhibitors will exhibit their products. This year, the world's largest industrial trade fair includes the Interkama Show (process control and chemical industry automation), the Factory Automation Show, and the Digital Factory Show.

Applications using VMEbus technology

Local Interconnect Network (LIN) is an extremely low cost serial fieldbus which is mostly used in car applications. It is approximately 50 percent less expensive than the Controller Area Network (CAN), or the J1890 bus system which is widely used in cars, SUVs, or trucks. Common applications are mirror control, window movement, seat adjustment, air conditioning, and door locking. ETAS (Germany), the former electronic control division of the Bosch group, has developed a VMEbus-based analyzer (ES1223.1) that

provides four LIN, two CAN, and two RS-232 interfaces.

The interfaces are galvanically separated (potential-free). The VMEbus board provides all power for all the interfaces and for the onboard CAN-LIN gateway. If used together with a VMEbus host (ES1130) in an ES1000.2 chassis, this analyzer becomes part of a "Rapid-Prototyping System." Software tools are available for the ASCET-SD development environment from ETAS.

Mektron (UK) and Miltron (USA) specialize in the design, development, and manufacture of turnkey, bus-based system enclosures or subsystems for commercial and military applications. Several patented features and processes make it possible to comply with some of the most extreme weight, cooling, and Electromagnetic Interference (EMI) requirements. These features include the lightweight, high tensile strength extrusions that are used in their patented "High Integrity Frame." This includes thermal and EMI protected hermetic gasket channels. Carbon fiber panels and structural elements, including carbon fiber air ducts, are used when an extremely lightweight solution is required. A unique patented air-to-air heat exchanger is used when a great deal of heat has to be removed in a space constrained environment. In a chassis with indirect forced air cooling there isn't any contamination from dust, gases, or moisture. Mektron's Crush-Fold technology provides a cost-effective, high strength, and superior EMI seal which requires a minimum of fasteners. Customized versions of these card cages for extreme cooling and EMI requirements are used in military "rapid-deployment systems" for "in-the-field" testing and analysis of airborne or land-based electronic systems and subsystems. For applications where hard disk usage is required, Mektron has fitted the hard disks with 3D shock-protected mounting to survive extreme shock and vibration conditions. In addition, Mektron supplies customized backplanes based on VMEbus or other technologies. Ω





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The technical challenges of building the world's most powerful telescope

By Jason Smith



It has been realized worldwide that, for optical and infrared observations, new advanced mountaintop telescopes offer huge potential for future discovery. Mountaintop telescopes more powerful than the Hubble Space Telescope (HST) can be built quicker and at less expense. Distances far greater than those possible with the HST can be observed from the ground, which will allow for detailed analysis of fainter and more distant sources. Moreover, the latest sensors, optics, and other technological advancements can correct atmospheric blurring and thus enormously improve image sharpness to a level far above that of the HST.

This article discusses the technical challenges in the design and construction of the Large Binocular Telescope (LBT) at the Mt. Graham International Observatory (MGIO) in southeastern Arizona.

Mirror design

The Mt. Graham International Observatory was selected for the 10-story, \$100 million project because of the 10,000-foot altitude, the low humidity, and the minimal amount of ambient light given off by nearby cities. While the HST was put into space to overcome the limitations of the atmosphere (e.g., air mass, and dust), the LBT overcomes atmospheric and additional limitations through the use of adaptive secondary mirrors and a two-primary mirror design.

The two-primary mirror design consists of two 8.4-meter (331-inch) mirrors on a common mount. This telescope will be equivalent in light-gathering power to a single 11.8 meter instrument. Because of its binocular arrangement, the telescope will have a resolving power (ultimate image sharpness) corresponding to a 22.8 meter telescope. As a result, the LBT will have a collecting area larger than any existing telescope, and will therefore provide unmatched sensitivity for the study of faint objects.

The University of Arizona Steward Observatory Mirror Lab was responsible for the fabrication and polishing of the two primary mirrors. The construction of the first primary mirror took four years, and included the creation of the mold, glass loading, casting, and removing and grinding/polishing of the mirror. The second primary mirror is about to enter the polishing phase, and is scheduled to be installed in late 2005. The LBT and its primary mirrors are shown in Figure 1.

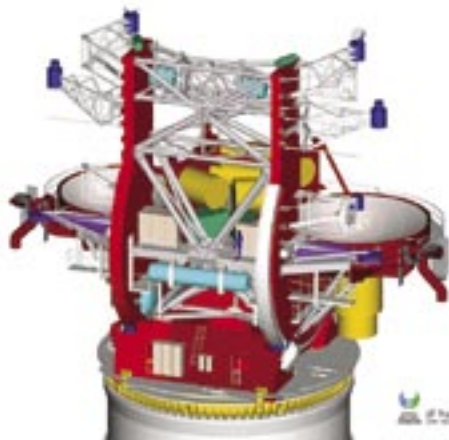


Figure 1

In addition to the two primary mirrors, the design utilizes a pair of curved secondary mirrors and a pair of flat tertiary mirrors to implement the focal stations and cancel the distorting effects of the earth's atmosphere. These smaller optics are moved in and out of the light path by swing arms.

The adaptive secondary mirror is mounted to a reference body via 672 actuators. Wave front sensors read the atmospheric distortion in real time, and then a computed force algorithm is used to determine how much actuator force is necessary to move the mirror to compensate for the distortion. Using an array of digital signal processors, the goal of the real-time loop is to execute at 1 KHz in order to properly cancel the distortion effects of the atmosphere.

The tertiary mirrors rotate to direct light to several central instrument locations. The tertiary mirror is mounted to a simple tip/tilt XYZ platform and will be controlled by a Linux computer system.

Key technical challenges in supporting the LBT primary mirrors

The key to the success of the LBT project lies in the primary mirrors. At a cost of more than \$8 million, each primary mirror weighs approximately 16 metric tons. A single primary mirror is shown in Figure 2.

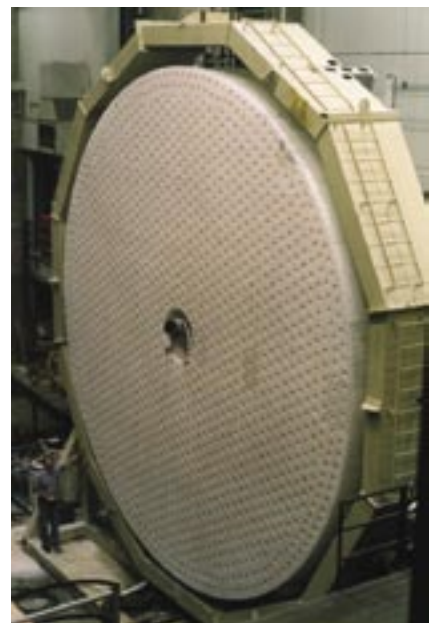


Figure 2

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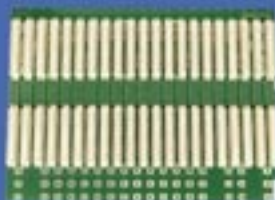
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Because the time and cost to produce a single primary mirror is so significant, the design and operation of the mirror support system is critical. Because the primary mirrors are so heavy, they can literally sag from their own weight and create distortion in the telescope's view. To compensate, 160 actuator support points that can make a minute correction to its section of the mirror support the thick honeycombed mirrors of the LBT.

The actuators are connected to the back of the primary mirror via load spreaders and metal pucks that are glued to the glass. The support actuators provide a metered force that push or pull the back of the mirror via precision controlled pneumatic pistons. Each of the 160 actuators has a simple Programmable Interrupt Controller (PIC) processor that communicates to a VMEbus SBC via an RS-422 serial channel.

The design goal of this configuration is to simulate the primary mirror floating in

a liquid of equal density. The 160 support actuators try to simulate this model by applying a corresponding force at specific points on the back of the mirror. The SBC determines and transmits a force, and the actuator's PIC processor receives the force command via the serial channel. The actuator then controls the air pressure in its onboard piston/cylinder to apply the necessary force to the back of the mirror. A load cell attached to the same glued-on puck is read by the SBC to verify the value of the applied force.

VMEbus SBC selection

One of the biggest technical challenges was to find VMEbus SBCs that can control the eight serial channels running at 115.2 Kbaud which is the bandwidth required to send the force command data streams using a 37 Hz real-time loop refresh cycle. After a careful analysis, four Synergy Microsystems Cougar 10 SBC boards (see Figure 3) were selected to make the mathematical computations

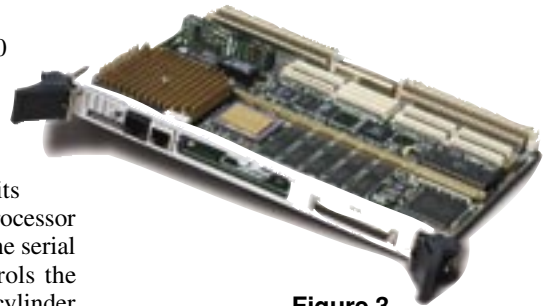


Figure 3

necessary to position and stabilize the two massive primary mirrors.

Each SBC supports an algorithm with a 37 Hz refresh rate in real time under the VxWorks Operating System, and is backed by a comprehensive VxWorks Board Support Package. Synergy SBC reliability was also a decision factor. The four SBC boards are mounted in a VME chassis approximately 50 feet from the primary mirror cell in a temperature-controlled room within the telescope structure.

International consortium

The LBT is under construction by an international consortium that includes Arizona State University, the University of Arizona, Northern Arizona University, Germany's Max Planck Institute for Astronomy, Ohio State Research Corporation, the University of Notre Dame, and the Italian National Institute of Astrophysics. Current schedules for the telescope, mirror, and enclosure suggest that first light will occur in summer 2004. The LBT structure is expected to be completed in June 2005, and ready for use by 2006. Once completed, it will have the greatest light-gathering capacity of any astronomical telescope in the world according to project officials. Ω

Jason Smith is the technical coordinator for the LBT project, and is responsible for the mirror cells and their integration into the LBT.

For further information, contact Jason at:

LBT Observatory

University of Arizona
933 N. Cherry Ave.
Tucson, AZ 85721
Tel: 520-621-4562
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Giving VME backplanes a shot in the arm

By Justin Moll

and Michael Munroe



The demise of VME has been greatly exaggerated. Nearly every year we hear how VME is destined to fade away and at the 2004 Bus and Board conference, the talk in the halls proved that VME will again have to face the same questions. What is different this time around is that many of us in the VME community are starting to fight back. The battle is on two fronts: building awareness of VME's continuing advancement, and the new technological developments in VME that will take us to the next level. For technical advancements, there are many. The Motorola-led VME Renaissance and other VITA initiatives bring a wealth of new products and ideas for VME.

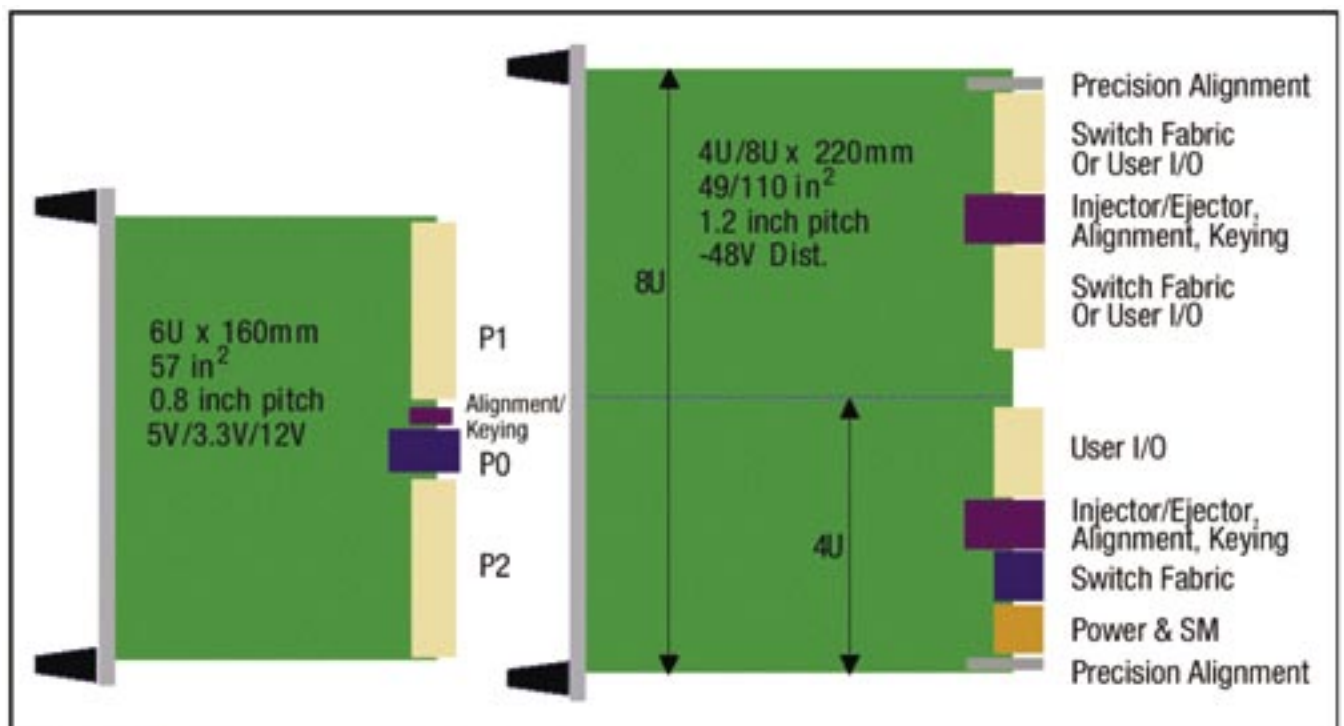
2eSST

You may have read of the new 2eSST technology that will bring standard VME backplanes from rough theoretical speeds of 80 MBps to 320 MBps. As the developers of the VME320 backplane (in 1997 in cooperation with Bustronic's consultant Drew Berding), we are particularly interested in how the new 2eSST-enabled boards perform in a VME320 system. We believe that the VME320 backplane would be a superior environment for the incident wave signaling capability of 2eSST drivers. Such an advantage might be of particular importance in very large systems where the combination of low voltage signals and background noise has created an adverse signaling environment. We are in

discussions with other vendors in testing the results. But, the most promising of the next-generation VME backplanes appears to be the VXS Backplane (VITA 41).

VXS backplane

The VXS Backplane starts with a standard VME64x backplane design and implements a high speed fabric by replacing the existing P0 connector with a new high-speed MultiGig 7 Row connector and adding hub slots fully populated with the new connector. The new MultiGig connector and hub slots carry the high-speed switch fabrics, while the P1 and P2 connectors will support legacy VME64x cards (see Figure 1).



VITA 41 and VITA 34 form factor comparisons

Figure 1

This design maintains full backward compatibility while adding high-speed serial fabric connectivity. VITA 41 designers will have the flexibility of plugging in standard VME64x cards for parallel bus only, integrate VXS payload and switch cards for parallel bus and switch fabric transport, or use the VXS cards for switch fabric transport only. The current switched serial interconnects utilized are Infiniband and Rapid IO. In the future, other fabrics may also be implemented.

Design concepts for the VXS backplane

Accomplishing the dense routing on a 0.8-inch pitch with signals at 3.125 Gbps or higher in the VXS backplane requires some creativity. Even a mid-sized 12-slot Dual Star VXS backplane configuration (see Figure 2) forces the designer to make some difficult choices. One issue to avoid is letting the layer count get too high. The costs rise considerably, the backplane performance can suffer, and it prevents the use of available standard components (if the backplane is too thick, many standard connectors don't have long enough tails to fit through the board).

Another design concept is to avoid undesirable stubs for upper layer backplane traces. This presents two options. One choice would be to have these worst-case vias back-drilled – a costly fabrication process which removes the unused portion of the plated via structure below the layer at which the signal is terminated. The other choice is to minimize the length of via stubs by choosing a laminate with a lower dielectric constant. This will allow the 100-ohm differential impedance to be achieved with

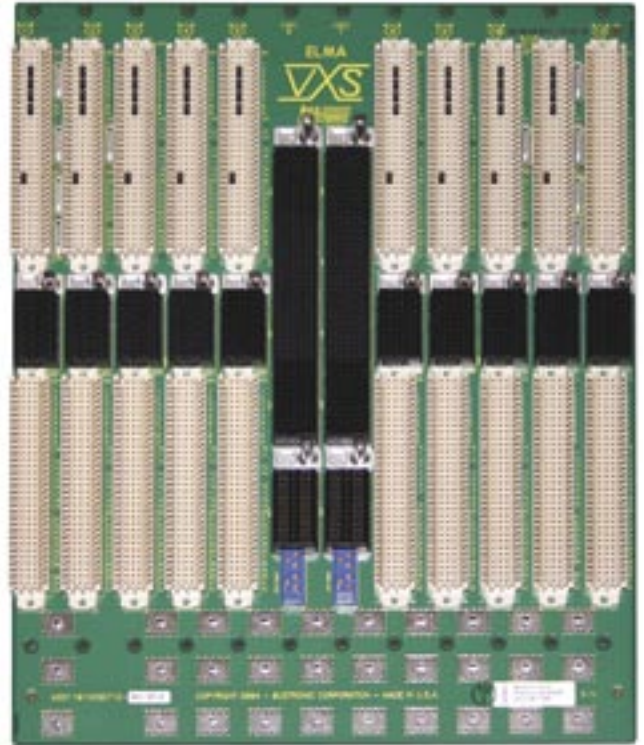


Figure 2

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thinner PCB layers. A lower dielectric constant (E_r) is not the only characteristic that makes higher performance board materials attractive. High-grade materials such as Nelco 4000-13SI, Rogers 4350, and Mashusutta's Megtron 5 also have significantly lower loss tangent values at these higher frequencies. The loss tangent value indicates a degree of undesirable interaction with a signal at a given frequency. In the 12-slot Dual Star example, Bustronic chose to develop the backplane using Nelco 4000-13SI. The result is much improved signal integrity which provides better overall performance. This VXS backplane required 18 layers, a manageable and reasonable number for a high-performance backplane. For other future configurations (smaller slot counts, Single Star configurations, etc.) a standard FR-4 laminate may be sufficient, depending on the performance required.

As we demonstrated in previous AdvancedTCA papers, placing the hubs centrally for a VXS layout in most Dual Star configurations is a good choice. It reduces the maximum trace length, and there generally is a vast improvement in signal quality as the losses due to dielectric and skin-effect will be considerably smaller. Further, intelligent routing strategies can be implemented to minimize the layers count. Aside from lower PCB costs, having fewer layers minimizes the stub influence and improves the signal quality.

There are also other new specifications today and on the horizon for giving VME a boost in performance. The VITA 46 specifi-

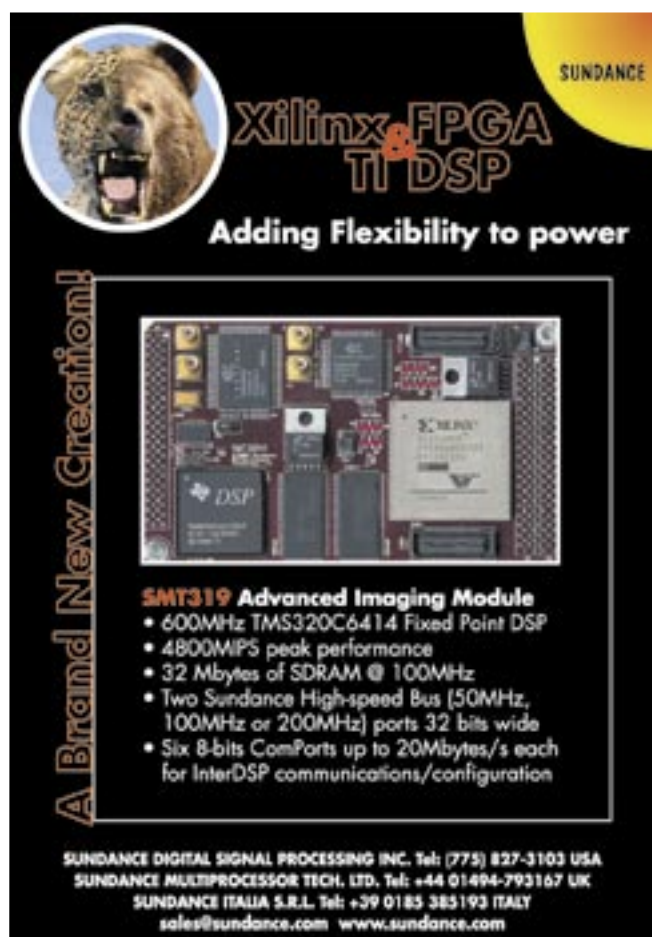
cation is being developed using many of the VITA 41 design concepts. VITA 46 appears to sacrifice backwards-compatibility for performance. One key goal is for more I/O signals. However, hybrid versions of either VITA 41 or 46 can have the backwards compatible VITA 41 payload slots with the 160-pin DIN connectors and slots on the side with all MultiGig connectors from top to bottom for more I/O and connectivity. We'll have to wait and see how the specification evolves. Other backplane-based VME technologies include VITA 31.1/31.2, and VITA 34.

Gigabit Ethernet over VME (VITA 31.1)

The VITA 31.1 backplane is very similar in concept to the VXS backplane. However, it uses the standard 2mmHM connector in P0. There is full backwards-compatibility with VME64x cards with P0 connectors. However, you are limited to the performance of the 2mmHM connector. At least one company has developed node cards compliant to VITA 31.1, and a couple of backplane vendors have designs in the queue that are ready to go to fabrication when needed. A VITA 31.2 specification has been initiated for a StarFabric version.

Embedded modular (VITA 34)

VITA 34 is an aggressive and forward looking approach to mechanical packaging. In some ways similar to AdvancedTCA, it has a new form factor and may forgo the VMEbus altogether (see Figure 1). One of the standout features is the use of liquid cooling. The cards would be encased in metal, providing a



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cooling mechanical format for the cards and greatly improving shielding. Some in VITA feel that this will be critical as chip speeds increase where heat dissipation and shielding become much more important. The development for VITA 34 has not moved forward as quickly as hoped. However, no one doubts that new packaging technologies will be required for future systems. Bustronic is working with other VITA members to make sure that backplanes will be available to support our customers' needs for new mechanical and environmental packaging designs.

VME awareness

Fed up with hearing how the 25 year old bus which is still the most dominant player in standardized embedded systems is doomed, members of VITA gathered to discuss how to combat the industry's critical misperceptions of VME. The misperception that has been held for many years is that VME is dead, that the bus is too old and slow to keep up with today's computing needs. The truth is that VME has continued to expand and improve over time. From the 16-bit to 32-bit to 64-bit days, and from J1 VME to VME64x to VME320, the technology has progressed. Customers tell us that one of the great strengths of the VMEbus is that so many products are currently available for every potential application. We are working on innovative designs to ensure that that legacy boards will continue to be supported far into the future. The addition of a high speed P0 serial fabric will continue to breathe new life into the bus. The VME marketing committee has been formed to build awareness that VME continues to advance, strengthen the VME "brand," and develop more user-friendly tools for information on VME. Contact VITA for more details.

Simulation

Simulation is increasingly becoming a critical factor in high-performance backplane design. The fabrics used over VXS and VITA 34 will have speeds of up to 2.5 Gbps per port or higher, for a fabric channel bandwidth of 10 Gbps. Backplane designers will increasingly use simulation as part of their design for both standard products and custom designs. These models are increasingly being requested by SI engineers responsible for leading edge system design. Bustronic has developed our Signal Integrity Initiative (SII) to continuously enhance our backplane measurement and characterization program. Later in the year, Bustronic will provide new simulation data and models on various VXS backplane configurations, in addition to our data on AdvancedTCA backplanes.

Conclusion

The age of the VMEbus (and the corresponding VITA standards) creates a negative perception in the industry. However, it should also be recognized that the legacy of VME provides a stable, reliable, well understood technology with a wealth of vendors and product availability. Just as important, the industry should be aware that VME has evolved and improved over the years, and will continue to do so. With new standards that advance the technology like VITA 31, VITA 34, and VITA 41, the industry can look forward to advanced VME solutions for today and well into the future.

Justin Moll has more than 10 years of high-tech marketing and sales experience and has been with Bustronic since 2000. As the director of marketing for Bustronic, he has led the company's charge in several next-generation technolo-

gies. Justin was recently re-elected as the VP of marketing for the StarFabric Trade Association. His previous positions include marketing services manager for E2I Corporation and account manager for Elcon Products International, now a Tyco Electronics company. Justin received his bachelor of science degree in business administration from the University of California, Riverside.

Michael Munroe is a technical specialist for Bustronic Corporation. In addition to 18 years of experience in the packaging and interconnect industry, Michael is an active member of the VITA Standards Organization, a professional member of the IEEE, and an officer of the PCI Industrial Computer Manufacturers Group (PICMG).

For further information, contact Justin and Michael at:

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What engineers need to know about VXIbus System Specification 3.0

By Scott Kovner

Last November, the VXIbus Consortium released revision 3.0 of the VXIbus System Specification. This new revision brings a faster data transfer protocol (2eVME) and more address space (A64) to ATE systems, while preserving compatibility. Engineers can use VXI 3.0 modules in their system if the software can configure those new modules.

VXI Consortium

The goal of VXI (VMEbus Extensions for Instrumentation) is to be an open VME-compatible platform for modular instrumentation which improves flexibility, modularity, footprint, speed, and cost. VXIbus is defined by a family of specifications issued by the VXI Consortium.

VXI extends VME with mechanical, electrical, and architectural features. VXI defines scalability of these features across the following module sizes:

- A-Size systems (3U) include resource management, word serial (for IEEE-488.2 messages), shielding, and cooling requirements.
- B-Size and C-Size systems (6U) add a trigger bus, local bus, slot identification, and analog connections.
- D-Size systems (9U) provide additional triggering, including a star trigger bus.

VXIplug&play Systems Alliance

The VXIplug&play Systems Alliance was formed to address software interoperability. The alliance issued a separate family of specifications that standardize the:

- Soft front panels
- Instrument driver functionality
- VISA (Virtual Instrument System Architecture) library
- Development environment frameworks such as LabVIEW and C++ (see Figure 1)

VXI modules must include the software that implements these specifications. For example, National Instruments controllers include NI-VXI, NI-VISA, NI VXI Resource Manager, and NI Measurement & Automation Explorer for managing VXI and VME devices.

The VXI 3.0 Specification

The goals of VXI 3.0 are to improve backplane performance and to enable the use of 64-bit processors for VXI control, while maintaining compatibility with previous VXI specifications. VXI 3.0 updates the VXIbus System Specification (VXI-1) to include the 2eVME protocol from VME64x, and the A64 address space from VME64 (see Figure 2).

This is not the first time the VXIbus Consortium has brought new VME64 technologies into the VXIbus specifications in order

VXI ATE Architecture

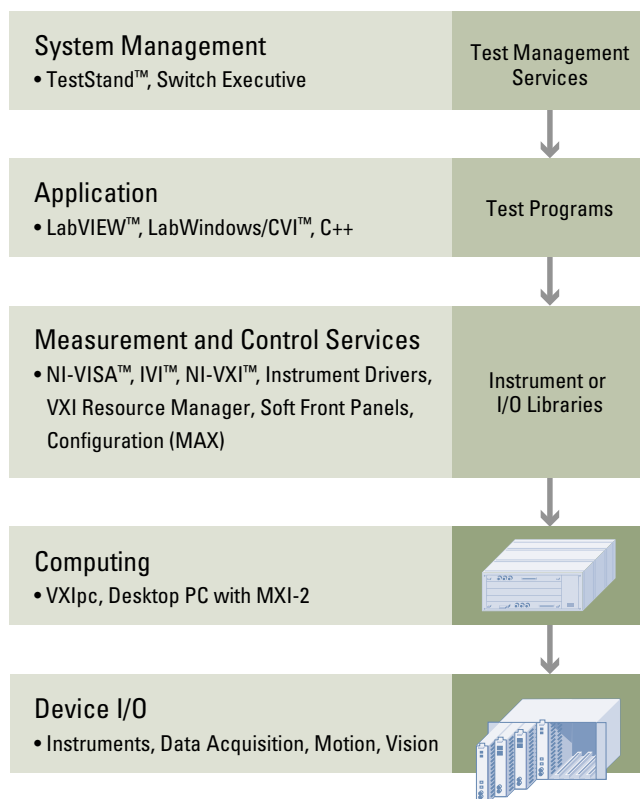


Figure 1

to improve systems performance. In 1998, VXI 2.0 added D64 transfers and the RETRY* signal to the VXI specification.

The 2eVME (2-Edge VME) protocol doubles the theoretical throughput of VXI. While VXI 2.0 specified 64-bit data transfers at 80 MBps, 2eVME doubles the theoretical throughput to 160 MBps. The *two edges* that give the protocol its name are the transitions in the data strobe and data transfer acknowledge lines. The VXI 2.0 specification uses the *four-edge* handshake protocol from VME64: two edges for asserting DS and DTACK, and two more edges to de-assert DS and DTACK. The 2eVME protocol in VXI 3.0 uses the last two edges to indicate a second data transfer, thereby doubling the data rate. Although VME64x defines 2eVME protocols for both 3U and 6U devices, the VXI

VXI Specifications	
VXI 2.0	VXI 3.0
Theoretically up to 80 MBps with 64-bit transfers	Adds 2eVME for up to 160 MBps transfers, theoretically
A16, A24, and A32 address spaces	Adds A64 address space
Message-based support through Word Serial Protocol	Unchanged
P2 connector supports 10 MHz clock, 8 TTL trigger lines, 2 ECL trigger lines, module identification, local bus, analog summing bus	Unchanged
P3 connector supports 100 MHz clock, 4 more ECL lines, 24 more local bus lines, Star Trigger lines	Unchanged

Figure 2

Consortium decided to simplify interoperability by recommending only the 6U protocol.

The new, separate A64 address space is capable of addressing 2^{64} bytes (or 18 Exabytes) of memory and registers. The A16, A24, and A32 devices do not occupy any of this new address space. VXI uses the VME mechanism for 64-bit addressing, where the address lines and data lines combine to form a 64-bit address.

Traditional VXI provides the following four address spaces:

- A16 address space
- A24 address space
- A32 address space
- A reserved address space



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VXI 3.0 uses the reserved space to indicate that the VXI device capabilities are stored in a new Enhanced Capabilities Register. The VXI Resource Manager must now decode this new register to determine if the device is an A64 device. Defining this new register, instead of simply using up the fourth address space, leaves room for additional address spaces in the future. However, if engineers use A64 masters and servants in a VXI system, they must have a VXI Resource Manager that understands the new VXI 3.0 register definition. National Instruments has released NI-VXI Resource Manager 5.0, which will configure A64 devices using existing NI-VXI controllers.

These new VXI 3.0 features (2eVME protocol, A64 addressing, and the new register definitions) are the only additions to the VXI specification. The new revision maintains the architecture of the previous VXI specification, thereby ensuring compatibility with existing systems.

Applications for VXI 3.0

The higher throughput and 64-bit addressing of VXI 3.0 allows the addition of high-speed modules to the VXI system. Given a 64-bit VXI controller with 2eVME support, engineers can use the system RAM of the VXI controller directly from a 2eVME capable VXI digitizer. If engineers allocate a buffer on the VXI controller, and write the full 64-bit address of each buffer to the digitizer, then the digitizer sends the data to the buffer using 2eVME transfers. Alternatively, the digitizer could hold the data, which could be copied from the digitizer by the VXI controller using 2eVME.

Engineers can make use of these new features with an existing controller if the controller has a VXI 3.0 capable Resource Manager. Some VXI systems use the VXI Slot 0 controller as a



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resource manager, operator interface, and top-level commander. These systems delegate control of some measurements to special purpose embedded computers (see Figure 3).

In this case, the 2eVME A64 Master manages the data acquisition and then communicates the results back to the top level commander in Slot 0 using traditional VXI protocols.

It is worth noting that the software stack for implementing these strategies is not complete. The VISA specification has yet to be updated to identify A64 addresses or to initiate a 2eVME data transfer, so engineers cannot currently create these examples in an interoperable manner. Therefore, software like NI-VXI Resource Manager 5.0 is just an initial step toward bringing VXI 3.0 to test systems. Ω

Scott Kovner is the VXI Software Group Manager at National Instruments. He was a member of the VXIbus System Specification 3.0 Technical Working Group and a contributor to the specification.

For further information, contact Scott at:

National Instruments

Tel: 512-683-6003

E-mail: scott.kovner@ni.com

Website: www.ni.com

Related information

VXIbus Consortium Website: www.vxibus.org

VXIbus System Specification 3.0 Announcement

Website: www.vxibus.org/pressreleases/pr01_19_04.html



Figure 3

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Distributed memory or shared memory?

By Doug Clarke

StarFabric unlocks the door to scalability as emerging systems leverage the powerful interplay of standards-based software and hardware modules for both shared memory and distributed memory platforms.



Distributed memory versus shared memory models draw a line that deeply divides system architecture designs into one or the other camp. The division is clear:

- Distributed memory favors memory-intensive processes where each processor has access to the full bandwidth of its memory.
- Shared memory benefits complex, inter-processor communication with CPU-intensive processes where message-passing latency is critical. It also favors tasks that require larger memories where one 4-gig space works better than four individual 1-gig spaces.

When a system is either entirely memory intensive or CPU/communication intensive, the choice is easy. Unfortunately, most real-world systems require both. Such systems can be built using distributed or shared memory architectures to meet the needs of both CPU/communication and Memory-intensive processes. But there are tradeoffs. The horsepower intended for a CPU/communication-intensive process will be wasted on a memory-intensive process. Likewise, the memory bandwidth provided for memory-intensive tasks will be wasted on a CPU/communication-intensive task.

Therefore, as platforms become larger and more complex, the need to unify both processes within an optimal system with separate parts for CPU/communication-intensive tasks and memory-intensive tasks becomes mission-critical.

An emerging open system model, Distributed Shared Memory (DSM), combines these design archetypes within a unified development environment. DSM enables system architects to simultaneously target and earmark resources for both localized CPU-intensive processes and localized memory-intensive processes.

The hybrid open system model of DSM uses both shared memory and distributed memory architectures to achieve optimal flexibility without performance or cost compromises.

Because DSM make a difference in board design, where programming models and communication modes are transparent to the system, the cost and complexity of writing the software and the expense of integrating totally different architectures to fit various parts of a system are greatly reduced. The way processors see memory

and communicate is at the heart of DSM, which is shown in Figure 1.

Memory

To software, memory is simply a specific location where data is read from and written to. It may be physical memory or virtual memory. It may be owned entirely by the CPU that is running the software, or it may be shared by several CPUs. Memory can belong to another CPU on the same SBC, to another SBC in the same chassis, to a chassis across the room, or in an aircraft via VMEbus,

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PCI-Ring, or StarFabric. If the software can't tell where the memory is and the same process is used for setting up memory – no matter where it is – then memory can be shaped to fit the system architecture. For those parts of the system that are memory intensive, a single CPU can have dedicated memory. For other parts that need the horsepower of several CPUs to work on one set of data, four CPUs can share memory. And when one process is generating a large block of data needed by another process, it can generate the data directly into the other CPU's memory. DSM platforms make memory appear local to a processor using memory-management software such as GBM/MPI™ from Synergy.

Communication

In process-to-process communication, ease-of-use and standard protocols sometimes take priority over throughput and latency. At other times, moving larger blocks of data quickly and efficiently is key. Clearly, one method alone is not the best solution for all problems. For instance, industry-standard protocols such as 10/100/1000 Ethernet tell pro-

cesses how to identify themselves and find other processes on the network. Another method, direct-memory mapping of shared memory over VME, PCI-Ring, or StarFabric enables processes to send data in the shortest amount of time and uses the hardware to ensure that the data is intact and delivered correctly. StarFabric, in particular, enables low-cost scalability and low-latency switching on VME-based platforms while delivering a full-duplex bandwidth of 400 MBps and class-of-service features essential to a high availability design.

The DSM platform from Synergy Microsystems, Power Matrix™, enables system architects to build flexible DSM solutions with custom modules for distributed memory and shared memory architectures (Figure 2). For example, low-end configurations can have as few as 5 to 20 CPUs consisting of single, dual, and quad SBCs in a 5-slot backplane where:

- Distributed memory on SBCs can be shared via PCI-Ring.
- Each CPU can communicate via GigE.

- All SBCs can share memory via the VME backplane and StarFabric.

Doug Clarke is a senior software engineer at Synergy Microsystems where he leads initiatives for clustered computing platform optimization using low-latency communication APIs and switch fabric interconnects to build custom topologies. Clarke holds a BS in computer science from California Polytechnic Pomona.

For further information, contact Doug at:

Synergy Microsystems, Inc.

9605 Scranton Road, Suite 700

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Tel: 888-479-6374

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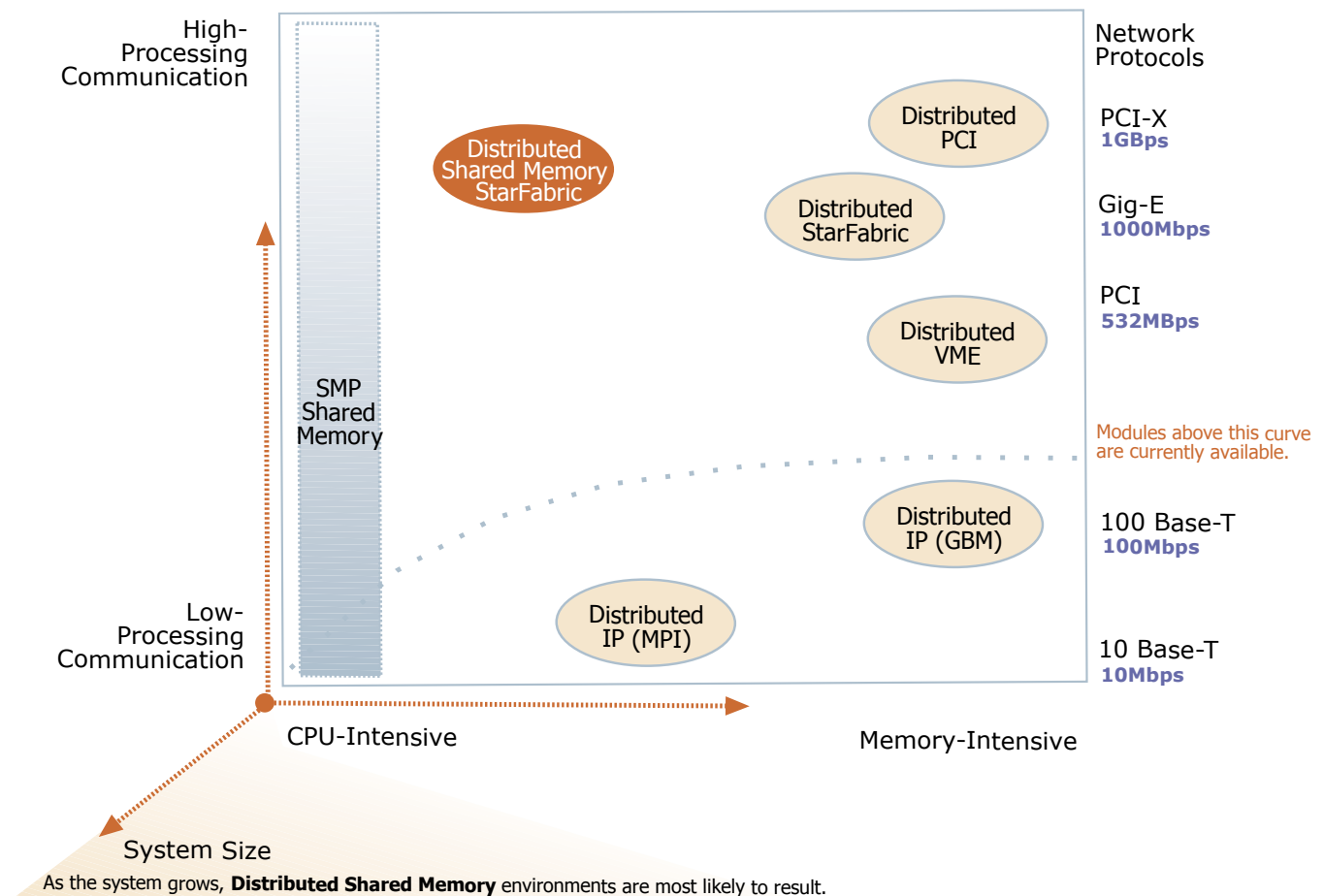


Figure 1

COTS TECHNOLOGY FEATURE

Hybrid DSM Environment	Distributed Memory Module	Shared Memory Module
Modules *	Hydra QX and DX	Manta QX and DX
CPUs	Quad and Dual PPC 7447	Quad and Dual PPC 7457
Application	Memory-intensive	CPU-intensive
Architecture	Distributed memory	Shared memory
Inter-chassis communication	StarFabric 10/100/1000 trunked Ethernet	StarFabric 10/100/1000 Ethernet
Intra-chassis communication	StarFabric 10/100/1000 trunked Ethernet VME via Tempe controller	StarFabric 10/100/1000 Ethernet VME via Universe II controller
Intra-board communication	PCI-X Loop shared memory 1000 trunked Ethernet via built-in switch	Shared memory
I/Os	2 64-bit PMC sites 4 RS-232	2 64-bit PMC sites 4 RS-232 2 MPSC RS-422/485 Firewire
Main memory	QX - 256 MB to 1 GB DDR-SDRAM per CPU DX - 256 MB to 2 GB DDR-SDRAM per CPU	QX - 256 MB to 2 GB DDR SDRAM (total) DX - 256 MB to 2 GB DDR SDRAM (total)
CPU speed	1 GHz to 1.3 GHz	733 MHz to 1.3 GHz
RTOS/BSP	Linux SMP, VxWorks, INTEGRITY	Linux SMP, VxWorks, INTEGRITY


* Other DSM product series choices from Synergy include the air-cooled Raptor and the conduction-cooled Rhino dual-processor SBCs.
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Figure 2

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Want to increase the performance of your VMEbus-based systems?

Try a combination of asymmetric multiprocessing and parallel processing

By Jürgen Eder

Today, VMEbus-based systems are used for such diverse applications as industrial automation, transportation, communications, medical technology, video processing, and signal data processing. High performance embedded applications in the commercial and government markets have ever-growing demands for raw processing power, a decrease in slot availability, and the need to interface to I/O using a variety of technologies. Often, VMEbus-based systems are customized to suit the needs of individual applications. VMEbus-based systems are also used in extreme temperatures that require cooling.

Introduced in 1981, the venerable VMEbus has seen just about every conceivable permutation to achieve performance gains. But do not fear; the VMEbus architecture has not run out of gas. Even higher performance can be achieved cost effectively by using an asymmetric multiprocessing approach where two processors on a single board share the workload. Parallel processing within each processor can also be used for even more performance. In this article, Jürgen will describe how asymmetric multiprocessing can be combined with parallel processing to greatly increase the performance of VMEbus board applications.

Asymmetric multiprocessing

Asymmetric multiprocessing refers to the type of multiprocessing where each processor in a multiprocessor system has its own operating system. In a basic configuration, the user interface and the network part of the system are implemented on the host CPU, and the I/O modules provide additional real-time processing. The SBS VG5 shown in Figure 1



Figure 1

will be used as an example. It is an ultra-compact 6U VMEbus PowerPC board. The block diagram for the board is shown as Figure 2.

Three different operating systems can be used with the VG5: VxWorks, Linux, and LynxOS. In the asymmetric multiprocessing mode, two different operating systems can run simultaneously on a card, with different tasks being carried out separately. The board comes with one or two processors; either a Motorola 800 MHz PowerPC MPC7455 processor, or a 1.0 or 1.3 GHz Motorola PowerPC MPC7457 processor. Both processors have their own chipset, access for a PCI Mezzanine Card (PMC), L3-cache, DDR-RAM memory, and Flash memory. These features allow the processors to run independently.

Onboard functions are distributed meaningfully across both processors (nodes A

and B), and each CPU node has its own private PCI-bus. A third PCI-bus and a Field Programmable Gate Array (FPGA) processor couple the CPU nodes together. This allows one processor node to access some of the functions of the other processor node. To increase performance, the cache areas of each processor node are separated. Memory caches L1 and L2 are integrated within the CPUs, whereas the L3 memory caches are external and are therefore available for each node.

The asymmetric multiprocessing is coordinated via the FPGA processor using approximately half of its available gates; the other gates are used for standard functions and are user programmable. The processors are synchronized via interrupts with the interrupt controllers residing within the FPGA, which considerably expands the interrupt capability. As the VMEbus is an asynchronous bus, mean-

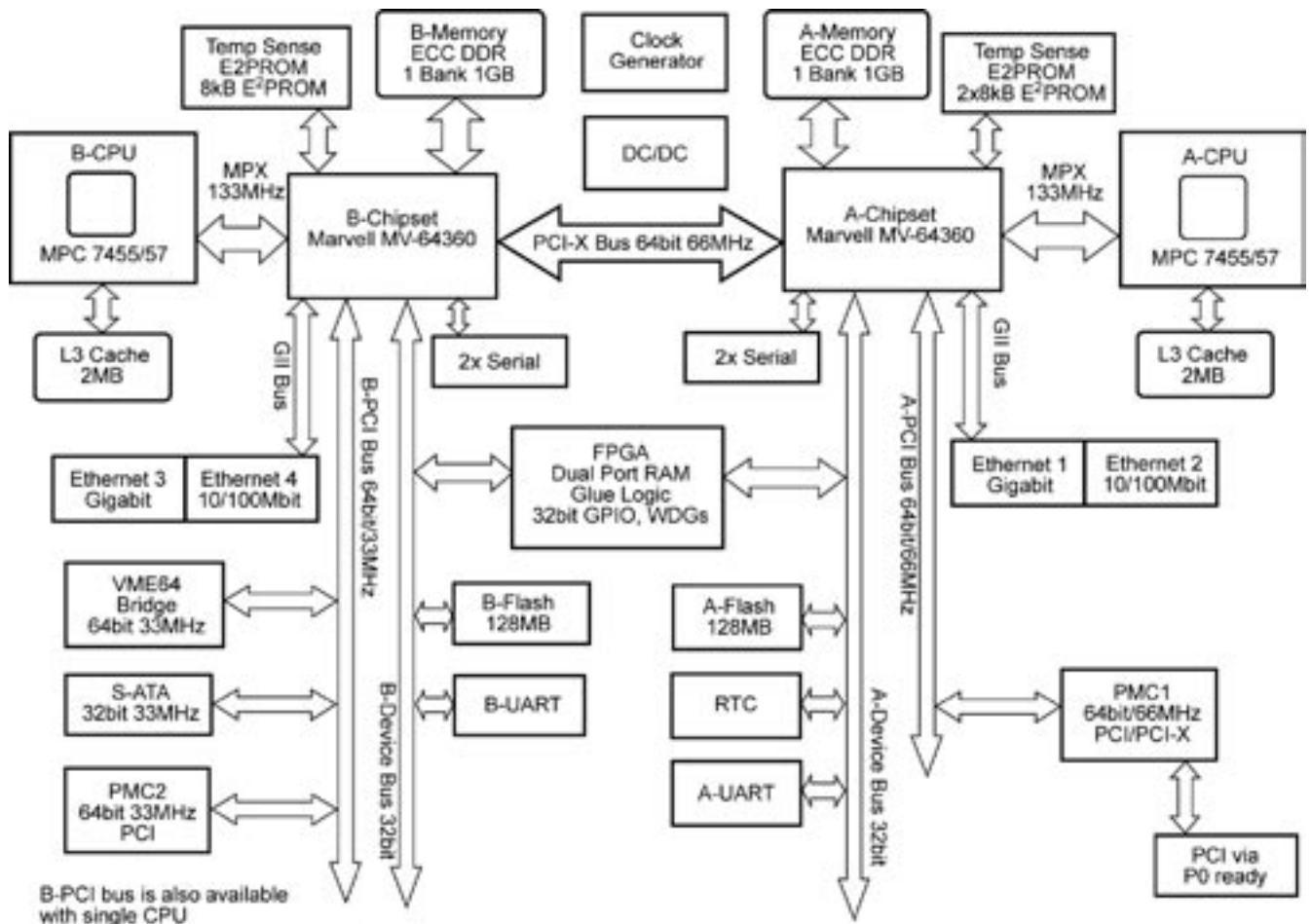


Figure 2

ing that clocks are not used to coordinate data transfers, data is passed between modules using interlocked handshaking signals; the slowest module participating in the cycle sets the cycle speed of each transfer. For fast data exchange between the processors, the SBS VG5 employs a 64-bit PCI-X bus.

Parallel processing

Parallel processing refers to architecture within a single processor that allows it to perform more than one operation at the same time. A differentiator of the MPC7455/57 processor family is that it is based on Motorola's AltiVec technology, which features a vector-processing engine designed to provide highly parallel operations. AltiVec allows for the simultaneous execution of up to 16 operations in a single clock cycle, thereby greatly accelerating embedded process-

ing operations for compute-intensive applications.

The AltiVec technology also contains the wide data paths and field operations that are required to process multiple vector processing requests. AltiVec offers considerable performance advantages over other processors, which have to carry out this type of processing sequentially and at higher clock rates. The higher clock speeds require more current and therefore need more cooling. Because it employs AltiVec technology, the MPC7455/57 processors use less current and do not require on-board cooling fans.

Rugged versions

Optional rugged features are available for applications that operate in environments impacted by temperature, shock, vibration, humidity, dust, salt, or mist. Options

for ruggedization include conduction cooling which is used mainly in military and aerospace applications where convection cooling cannot be used. Conduction cooling allows heat to conduct through the Printed Circuit Board (PCB), or through a conduction plate on the backside. Special expanding card guides then transfer the heat through rails and out to the chassis. The cooling design enables the board to be used in extended temperature ranges of -40° to $+85^{\circ}\text{C}$.

Other ruggedization features include conformal coating for environmental protection, while stiffener bars and wedge locks permit increased push loads and oscillation loads. The VG5 only requires 30 watts of power to operate, which enables cooler operation. Comparable processors from other chip families require much more power.

The VG5 simplifies testing through a JTAG interface for access to the most complex assemblies for testing, debugging, in-system device programming, and hardware problem diagnosis. The JTAG interface on the VG5 is located on the rear I/O connectors, enabling the system to be tested during runtime.

Conclusion

VMEbus-based systems are used for applications that require increasing levels of raw processing power and the need to interface to I/O using a variety of technologies. The performance of VMEbus can be increased in a cost-effective manner by using a combination of asymmetric multiprocessing, and parallel processing

within each processor. This is good news for many developers, as the VMEbus supports a variety of compute-intensive tasks and has maintained its popularity as an important industrial and military protocol.

Jürgen Eder has been with SBS Technologies since February 1998. Based in Augsburg, Germany, he holds the position of product director for the SBS CPU board products in the commercial and government markets. He has 13 years of experience in the semiconductor industry, having worked for the Intel Corporation in technical training, field application, and European marketing. Jürgen studied electronic engineering and has application engineer experience in the industrial automation market.

For further information, contact Jürgen at:

SBS Technologies
Corporate Headquarters
2400 Louisiana Blvd. NE
Suite 5-600
Albuquerque, NM 87110
Toll free: 800-727-1553
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American ELTEC		www.eltec.de/us					
E128	•						
Eurocom 148			•				
Computer Modules		www.compumodules.com					
SVA031			•				
Concurrent Technologies		www.gocct.com					
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VP 100/010			•				
VP 100/010-E			•				
VP 100/01x			•				
VP 101/010			•				
VP 101/011			•				
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DENSAN Systems		www.densan.com					
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Dynatam (continued)		www.dynatam.com					
DMC	•						
DPC2			•				
Pentium Board w/Windows NT	•						
GE Fanuc Automation		www.gefanuc.com/embedded					
VMIVME-7658	•						
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V269 Equinox							•
Janz Computer		www.janzag.de					
VMOD-P5	•						
Kontron		www.kontron.com					
400-H33E	•						
Gamma7			•				

Company Name Model Number Website	Pentium	Pentium Mobile	Pentium III	Pentium III Mobile	Pentium 4 Mobile	Celeron	Xeon
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A13			•				
EM02			•				
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RadiSys Corp		www.radisys.com					
EPC-1009	•						
EPC-1316			•				
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C5110	
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MFCC 8441	
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RIO2 8060 Target processor	
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Concurrent Technologies	www.gocct.com
VP 740/20x	
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Concurrent Technologies (continued)	www.gocct.com
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Momentum Computer	www.momenco.com
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Motorola Computer Group	mcg.motorola.com
MVME1603e	

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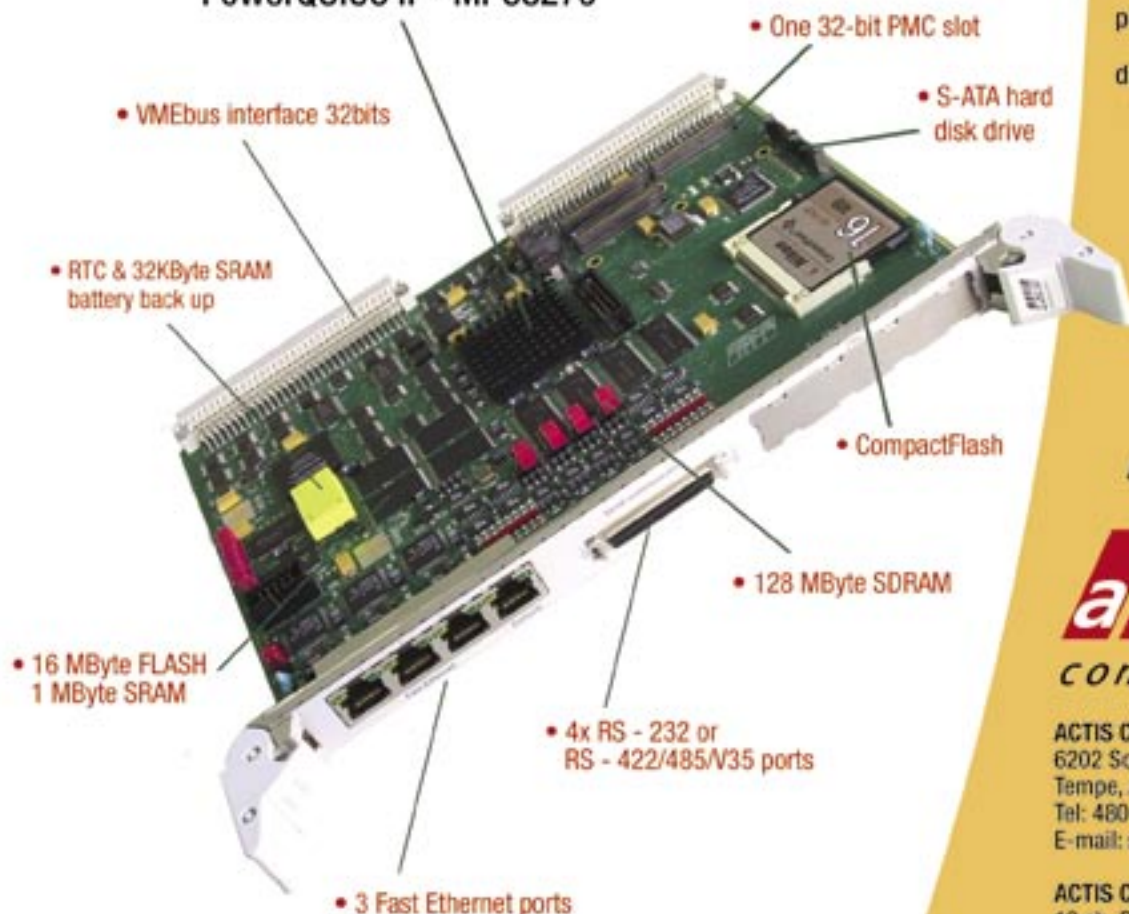
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M312		•						
Aitech www.rugged.com								
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SVA012						•		
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CsLEOS OS	A layered, embedded operating system, certifiable to the highest aviation industry reliability standards • Uses the industry-standard ARINC-653 application programming interface to implement brick-wall time and space partitioning • Fully documented for, and certifiable to DO-178B, Level A, for safety-of-life applications • Multiple channel synchronization • Fast restart (in-air) • Automatic fault logging • Guaranteed fault response • Multiple partition schedules • Flexible partition time slice • Safe shared memory access • Separately loadable applications • Shared library support • Supervisor partitions support • Configurable virtual memory support
CMX Systems, Inc.	www.cmx.com
CMX-Tiny+	A real-time multitasking operating system for processors families such as MicroChip PIC18Cxxx, Motorola 68HC08, Hitachi H8/300 & H8/300H & H8S, Atmel AVR family, Infineon (Siemens) 80C16x, Toshiba TLCS-900, NEC 78K0/K0S, TI MSP430, STMicroelectronics ST7, and others • Provides slightly less functionality than the CMX-RTX RTOS • Fits within 512 bytes of onboard RAM • Features include control tasks, control events, control messages, control resources, control cyclic timers, interrupts allowed to signal tasks, true preemption, cooperative scheduling allowed, fast context switch times, and low interrupt latency
Flash Vos, Inc.	www.flashvos.com
SOS	An operating system that allows multiple x86 operating systems to run on a single computer • Install and run any operating system • Create, manage, and modify disk partitions • Run multilingual environments with ease • Set up and manage simulation or test environments • Create and run various databases on any x86 platform • Remote monitoring and control through the Internet • Run applications without launching an operating system (embedded x86 application support) • Access the Internet without launching an operating system (embedded x86 network application support) • Restrictively manage and share partitions between operating environments
Green Hills Software, Inc.	www.ghs.com
INTEGRITY RTOS	A secure, royalty-free, real-time operating system intended for use in embedded systems that require maximum reliability • Fast, deterministic, real-time response • Protected address spaces • Guaranteed resource availability • Distributed multiprocessor support • Dynamic task download • Field upgrade and debug • POSIX API • Comprehensive communications protocols • Powerful development tools • Optimizing C/C++/EC++/Ada95 compilers • Execution profiling • Advanced debugging capabilities • Real-time event analyzer • Runtime error checking • Kernel object access control • Processor support includes: PowerPC, PowerQUICC III, MIPS, ARM, and XScale • Available with a variety of board-support packages • Available with extensive support for networking, embedded internet, and telecommunications protocols
LinuxWorks, Inc.	www.linuxworks.com
LynxOS-178	A certifiable RTOS for safety-critical computing • DO-178B and EUROCAE/ED-12B certifiable, POSIX-conformant RTOS solution • COTS package • Designed to be tightly integrated with the LynxOS Certifiable Stack (LCS) • The LynxOS-178 product family includes: A suite of standards-based development tools, full customer support including DO-178B capable consulting services, and an artifacts package for the OS with DO-178B required documentation
MEN Micro Elektronik GmbH	www.menmicro.com
Linux OS	An embedded Linux OS for MEN single board computers • OS is SYSGO's ELinOS implementation of embedded Linux and it has been ported to MEN Micro's single board computers based upon the PowerPC MPC8245 Kahlua II processor • SBCs are available in VMEbus and CompactPCI form factors, as non-bus SBCs, or as standalone compute boxes
Micro Digital, Inc.	www.smxinfo.com
pmDOS	A replacement for DOS and DOS extenders • Developed for embedded applications, that have outgrown the limitations of DOS • Allows smooth migration to 16-bit protected mode • Larger address space • No royalties • Segment protection • Multitasking • Built from standard Micro Digital products including pmEasy16 – 16-bit protected mode environment and loader; smx16 – real-time multitasking kernel for 16-bit protected mode; unDOS – protected mode DOS emulator; and smxFile – DOS-compatible file manager with floppy and IDE drivers

RTOS Products

PRODUCT GUIDE

Company Name/Model Number	Website/Description
Microsoft www.microsoft.com	
Windows CE 3.0	A small-footprint embedded operating system • Integrated development and testing tools including Platform Builder 3.0, Embedded Visual Tools, and Win32 API • Modular architecture for rapid configuration • Nested interrupt support and 256 priority levels • Windows Media and DirectX API GUIs • Supports 180 CPUs and hundreds of board support packages, buses, storage media, and device drivers • Enables user to build hardware support with Platform Builder 3.0 tools • Application services include Distributed COM (DCOM), ActiveX Data Objects, and Microsoft Message Queue Service • Customizable Internet Explorer 4.0 browser and an HTTP 1.0 server • Supports 32-bit CPUs from ARM/StrongARM, MIPS, Power PC, SuperH3/4, and x86 • Drivers supported include serial, parallel, Ethernet, USB, PCMCIA, display, NDIS, A/V, IrDA, printer, smart card, TrueFFS, and MDD • Supports the following standards: TCP/IP, MTML, Dynamic HTML, XML, HTTP, FTP, SNMP, PPTP, PPP, SSPI, SSSL, RAS, Wininet, and Internet Server API (ISAPI)
Windows NT Embedded 4.0	An embedded operating system • Built-in network connectivity • C2-level security • SMP support • Headless support • Flexible page file options • Remote management • Boot/operate from CD-ROM or Flash media • Built-in and selectable network protocols include TCP/IP, PPTP, IPX/SPX, NetBEUI, and AppleTalk, plus easily selectable network adapters and drivers • Support for selectable network services like DHCP client and server, remote procedure call, RAS client, RRAS, and SNMP • IIS 3.0 and FTP services • Windows services include COM, DCOM, DNS, open database connectivity, telephony API, NTLM, and WINS • Target designer and component designer • Developer system requirements: 300 MHz Pentium, 64 Mbytes of RAM, and 90 Mbytes of free disk space • Target device requirements: 12 Mbytes of memory and 8 Mbytes of storage
Motorola Computer Group mcg.motorola.com	
HA Linux	A high-availability Linux platform based on the CPX8000 hardware architecture • Provides hot-swap capability • Dual I/O architecture is designed to isolate any I/O board failure • Domain management services provides a set of facilities to manage the operation of non-system slot processors and related applications for call server applications • Remote network services through the SNMP-based network management facility allows a network operator to visualize, monitor, and control the operation of an HA system using a browser based on Java • The checkpoint agent is a general-purpose checkpointing service provided for applications to exchange state information and data to enable a standby application to quickly transition to active state and to provide network or subscriber services after an active application switchover
Radisys (Microware) www.radisys.com/microware.cfm	
Enhanced OS-9 v3.0	An updated version of OS-9 that supports more than 10 SBCs ranging from CompactPCI and reference designs to VME and MBX • POSIX compliant • Suitable for use in high-availability networking and communications equipment, digital television, Internet equipment, industrial process and control applications • Incorporates an integrated communications framework providing the ability to add or replace protocol stacks without disturbing the application • A patented dynamic downloading feature enables high availability approaching 100%, even during product maintenance • Process model architecture protects against accidental or malicious system software corruption • Integrated partner software includes Personal Java and networking software (ATM and SNMP)
Synergy Microsystems, Inc. www.synergymicro.com	
Industrial Linux	Industrial Linux is a result of a partnership between Synergy and FSMLabs, inventors of open source RTLinux (Real-time Linux) • Available on Synergy's entire line of PowerPC-based boards • Symmetric Multiprocessing allows applications to efficiently use a multiple-processor board by dynamically balancing the processing load equally among all the processors on the board
Linux SMP	A Linux distribution with Symmetric Multiprocessing (SMP) capabilities • Open-source, UNIX-based OS • 32 and 64-bit multitasking • Virtual memory • Multi-user capability • Supports most X-based programs • Supports Unix 4.2 and SVR4 • Windows and DOS emulators available • Advanced networking capabilities • Supports all common Internet Protocols

continued on page 52

RTOS Products

PRODUCT GUIDE

Company Name/Model Number	Website/Description
VenturCom, Inc.	www.vci.com
Boot-NIC	A virtual bootable hard drive hosted on a centralized LAN Server running Windows NT or 2000 • Transfers the functionality normally performed by local hard drives to image files on the network server • Operating systems, data, and software are stored on the server in hard drive, with the application processing taking place at the client, or connected equipment • Centralizes the virtual local drives, allowing users to manage all client images from one area • Boot-NIC enabled equipment requires a standard PXE boot ROM or 3Com MBA compliant firmware • Server stations require Windows NT or a Windows 2000 workstation license or server license as appropriate for the applications software
DCX	A scalable middleware for real-time data/control exchange between software components, including applications, device drivers, and OPC clients • Architecture for real-time data transfer between real-time processes and Win32 applications • Efficient publish/subscribe data transfer model • High-performance deterministic and real-time operation • Central administration for named data • Device driver standards fostering industry-wide Plug and Play • Device driver abstraction to a generic software component level • An OPC server for data and configuration access • Support for groups of data for transfer offering time/event consistency • Scalable from a small monolithic application to largest multi-component architecture
DOS-Extender	A real-time DOS Extender that turns DOS into a true 32-bit multitasking operating system • Does not replace DOS, but runs on top of it, so users can still use all existing DOS services and drivers • Puts applications into 32-bit protected mode, schedules tasks based on priorities, and gives program access to a 4-Gbyte address space • Converts applications into a priority-driven, multi-threaded, 32-bit, system • Using a compatible subset of the Win32 API, the same API used with Microsoft Windows, users can write and compile code using the industry standard Visual C++ compiler from Microsoft
RTX v5.0	Software that enables Windows NT/2000 to function as both a general-purpose operating system and a high-performance, real-time operating system at the same time, on the same computer • Provides Window's developers absolute control over when their critical processes execute • Companion products include Platform Evaluator and Time View • Supports standard HAL (Hardware Abstraction Layer) installations for both uniprocessor and multiprocessor systems as well as ACPI multiprocessor systems • RTX threads in the Win32 environment do not set thread priority to the real-time priority class • Latest functions include: WaitForMultipleObject using WaitForAny and up to 16 objects; RtGetTimeQuantum; RtSetTimeQuantum for time slice scheduling on a per thread basis; Threads and Processes supported as synchronization objects, waitable exit, and termination; RtOpenProcess; RtGetExitCodeProcess; RtTerminateProcess; and RtCreateProcess for supporting process management calls • Graphical object viewer tool enables viewing all RTSS objects and status • RTX Server is supported as a separate graphical tool and provides logging and other user selected capability • Win2000 power management suspend and hibernate functions are supported in an RTX plug-and-play RTXPo driver so that RTX processes will hibernate for power management
Xecom, Inc.	www.xecom.com
MicroRTOS	A real-time x86-based operating system with integrated web server • Embedded Web Server runs as a system task • Integrated preemptive real-time kernel • Communication and data sharing between the system, user developed tasks, application CGI programs and Java applets • Console A and B system tasks support user/developer local access through two RS-232 ports • Console B system task also supports remote user access through a connected modem • Ethernet interface capabilities supported by a TCP/IP stack • System calls for controlling digital and analog I/O's and real-time clock • A user account/password setup and management capability • Web server and user application task AUTO-RUN mechanism

PXI Chassis



New!

PXI Products from
Racal Instruments

Meet our newest family members

Racal Instruments is proud to announce the latest addition to our Test and Measurement family - a suite of PXI products to complement our already broad range of instrumentation and switching choices for VXI and GPIB/Ethernet/RS-232.



PXI Modules

You've always known you could count on Racal Instruments for the latest technology in test and measurement. Flexible and modular, off-the-shelf or custom-configured, commercial or military, we have the breadth of experience and depth of expertise to provide the right solution for your most demanding applications. Because at Racal Instruments, our business is automatic test. And we make sure you get the answer - regardless of platform.

Our new additions are high-achievers, following in the footsteps of Racal Instruments products for over 45 years. Our 14-slot PXI chassis features market-leading cooling and a single-bridge backplane for optimal signal throughput. The plug-in modules offer signal sourcing, control and upgradeability for current and future requirements.

Visit us at www.racalstruments.com and find out more!

Racal Instruments
Irvine, CA
1-800-722-2528

RACAL
INSTRUMENTS

info@racalstruments.com
sales@racalstruments.com

RSC# 53 @www.vmebus-systems.com/rsc

Semiconductor Products

PRODUCT GUIDE

Company Name Model Number Website	FPGA	Bridging	DSP	Bus Interface	MIPS
Annapolis Micro Systems, Inc. www.annapmicro.com					
WILDSTAR II	•				
Acromag, Inc. www.acromag.com					
PMC-DX500/DX2000	•				
Alpha Data www.alpha-data.co.uk					
ADM-XRC-II/II Pro	•				
Alphi Technology Corporation www.alphitech.com					
ATC-ALTERA	•				
American Logic Machines www.alm-net.com					
Genesis VL32		•			
GENESIS VP3232		•			
Anadigm www.anadigm.com					
AN10DS40	•				
FilterDesigner	•				
Annapolis Micro Systems, Inc. www.annapmicro.com					
1.5 Ghz A/D I/O Card	•				
BittWare, Inc. www.bittware.com					
Reef-PMC+	•				
Cypress Semiconductor www.cypress.com					
CY7C960 and CY7C961				•	
DNA Computing Solutions www.dna-cs.com					
EAGLE series	•				

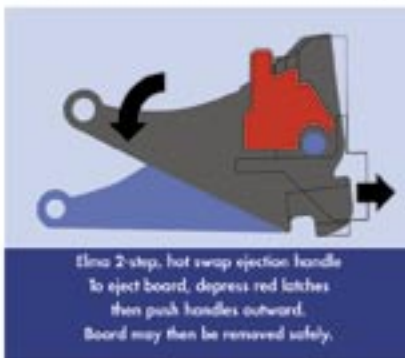
Company Name Model Number Website	FPGA	Bridging	DSP	Bus Interface	MIPS
DRS Technologies www.drs.com					
Chameleon VME	•				
Eonic Systems, Inc. www.eonic.com					
PowerFFT			•		
Epic Semiconductor www.epicsemi.com					
Ei68C153				•	
Inicore, Inc. www.inicore.com					
iniVME				•	
VME-64	•				
MEN Micro Elektronik GmbH www.menmicro.com					
M39				•	
Pentek, Inc. www.pentek.com					
6250	•				
6251	•				
Polycom www.polycom.com					
Banshee			•		
QuickLogic Corp. www.quicklogic.com					
QuickMIPS					•
Tundra Semiconductor Corporation www.tundra.com					
Tsi148		•			
Universe II		•			

cPCI & VME64X handles from Elma: Lock on to a better handle.



Hot swap safely at the touch of a button. Automatic locking handles from Elma provide a secure, dependable method to insert hot swap boards. By choosing Elma you'll enjoy flawlessly designed, insertion/ extraction handles that are built like a Swiss watch. Superior insertion geometry and ergonomic design provide maximum lateral force with minimum vertical force for easy operation.

Elma hot swap handles serve as a drop-in replacement for most popular front panel handles, and can be engineered for non-hot swap applications



as well. Elma's line of CPCI and VME64X front panels are available off-the-shelf or adapted to your specifications. They are IEEE 1101.10 compliant and feature special shielding for better EMC protection. Manufactured using the finest materials and methods, Elma front panels are the number one choice for performance, durability and quality.

Call today for more information on hot swap handles and superior front panels from Elma.

ELMA
Your Solution Partner

Elma Electronic Inc.

Phone: (510) 656.3400
Fax: (510) 656.3783
www.elma.com
e-mail sales@elma.com



- 2-step extraction process prevents premature board removal and protects hot swap functionality
- Improved handle geometry for high insertion/extraction force applications
- Handles are compatible with industry standard front panels
- Easy unlocking of handle using red push button, prevents inadvertent extraction of adjacent handles

You'll be amazed where you find VME...

It's common knowledge that VMEbus is used in military and aerospace environments. When NASA chose their electronics for all their Mars missions and shuttle launch controls, they chose VME. The U.S. Navy has repeatedly chosen VME for their most rugged and demanding applications. But you may not know that VME can be found in many other challenging applications, including airport people movers, high speed trains, satellite communications systems, and so many other areas.



That's no surprise. VME has earned its stripes for reliability, dependability, and ruggedness. You can count on VMEbus product being both available and supported over a long time period. No other open bus technology could meet those criteria. That's why VME is the first choice for any application that needs reliability, robustness, open systems flexibility and above all, longevity.

VME is all that...and more. There are many exciting new technologies available and emerging, so visit the VITA.com website to see what VME can do for you.

VMEbus International Trade Association www.vita.com



VME/VXI

Product Directory

Dear Readers,

The challenge for the VME and VXI markets today is to meet upcoming evolutionary needs to accommodate high-performance switch fabrics, high-speed I/O capabilities, state-of-the-art power requirements, and more. Added to that challenge is the task of achieving and maintaining backward compatibility through existing hardware and software COTS products.

One such standard currently being developed to meet these challenges is VITA 46, due to be finalized by January 2005. This standard will work in conjunction with VITA 41 and VME Renaissance to provide a complete VME market solution.

In the interim, defense and aerospace applications together with rugged commercial applications will play a huge role in stabilizing the VME/VXI markets.

VMEbus Systems is pleased to offer this catalog of products suitable for current and future VME/VXI projects. Peruse through the following pages, or refer to the table of contents below to find the specific products for your project.

Your OpenSystems Publishing Team

VME/VXI Product Directory

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Carlo Gavazzi Mupac, Inc.

10 Mupac Dr.

Brockton, MA 02301

Tel: 800-926-8722 • Fax: 508-588-0498

CG MUPAC
A Carlo Gavazzi Group Company**714T ATR Chassis**www.cgmupac.com

CG Mupac's 714T Series ATR Chassis provides the highest available power supply wattage through its innovative heat spreader design to target your high-performance military and transportation applications.

The 714T was designed to meet the requirements of the ARINC 404A/MIL-STD-91403. In addition to its innovative heat spreader design, this all aluminum chassis has been dip brazed to completely seal the enclosure and quickly conduct heat away from the boards and power supply. Up to 135 watts can be expected from the power supply while the chassis is in a 50°C ambient environment. The power supply plugs directly into the backplane to eliminate the need for power cabling to the backplane.

**FEATURES:**

- Conduction-cooled ATR (Air Transport Rack) chassis
- Meets ARINC 404A/MIL-STD-91403
- Up to 135 watts in 50°C ambient environments
- Power supply plugs directly into the backplane
- Accommodates VME64, VME64X, and CompactPCI backplanes
- Custom backplane configurations are available

For more information, contact gavazzi@mupac.com.RSC #5801 @www.vmebus-systems.com/catalogrsc**Ballard Technology, Inc.**

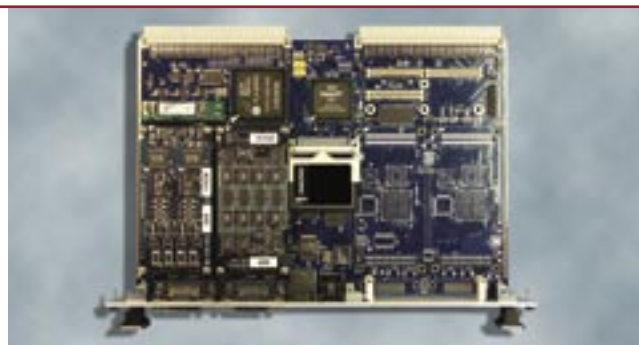
3229A Pine Street

Everett, WA 98201

Tel: 800-829-1553 • Fax: 425-339-0915

Ballard Technology**OmniBus VME**www.ballardtech.com

Ballard's OmniBus VME avionics databus interfaces set a new standard for flexibility and power. They are available with up to 64 ARINC 429 channels, or with a mix of protocols (MIL-STD-1553, ARINC 429/708/717, serial, Ethernet, etc.) and are suitable for a broad range of applications. Extensive capability is provided for easy-to-use simulation, monitoring, and testing. An onboard PowerPC® processor can be programmed by user to off-load or run independently of the VME processor. The OmniBus VME may run locally through the VME backplane, remotely via Ethernet, or standalone from user code embedded on the PowerPC. A variety of tools are available to simplify operation and software development. OmniBus is also available for PCI, CompactPCI, and Ethernet/USB.

**FEATURES:**

- Up to 64 ARINC 429 channels
- Parametric versions available
- IRIG time-tags/synchronization
- Ethernet (10/100) and serial (RS-232)
- PowerPC user processor/CompactFlash socket
- Available PMC site

For more information, contact sales@ballardtech.com.RSC #5802 @www.vmebus-systems.com/catalogrsc

Crane Aerospace & Electronics

P.O. Box 97005

Redmond, WA 98073-9705

Tel: 866-283-0926 • Fax: 425-882-1990



VME Power Solutions

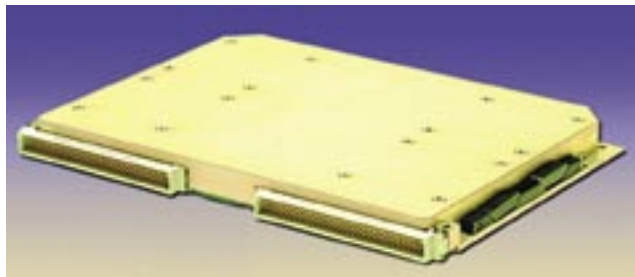
www.craneaerospace.com

Crane Aerospace & Electronics' rugged VME format card power supplies offer the ultimate in power conversion dependability for your avionic, vetronic, and other high-reliability system needs. Extensive reliability growth testing is performed to assure the integrity of the design and manufacturing processes. We use modular building blocks to offer you custom configurations with the maximum degree of flexibility.

Designed for military and aerospace applications, our power supplies operate using standard 28v dc input power and provide multiple output voltages.

Crane Aerospace & Electronics has a staff of highly skilled application engineers that will work with you in the event that additional modifications are needed to assure that your power system requirements are met.

Visit us at our website at www.craneaerospace.com, call toll free at 866-283-0926 (425-895-4053), or send an e-mail to electronics@craneaerospace.com.



FEATURES:

- Standard VME (Eurocard) form factor
- 28v dc input
- Multiple outputs
- Overcurrent/overvoltage protection
- Short circuit protection for all outputs
- Operating temperature up to 85°C without performance derating
- Conduction or air cooled
- Designed for military/defense and aerospace applications
- Custom configurations to your specifications

Highland Technology

320 Judah Street

San Francisco, CA 94122

Tel: 415-753-5814 • Fax: 415-753-3301



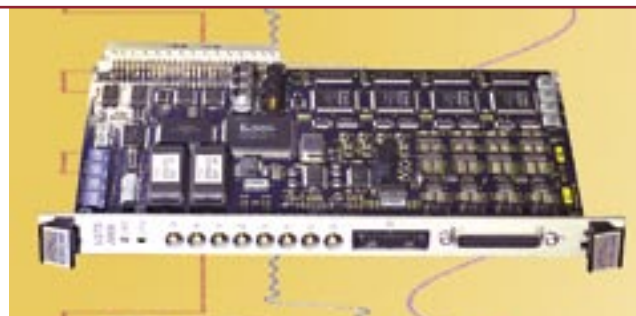
V370/375 ARB

www.highlandtechnology.com

The V370 series VME arbitrary waveform generators provide accurate simulation of real-world sensor inputs making them ideal for simulation of sensor signals from complex rotating machines. Four channels generate complex pulse trains with real-time control of relative pulse positions and amplitudes and generation of pure and distorted polyphase AC waveforms, with all waveshape parameters smoothly variable in real time.

Four independent DDS frequency sources ensure smooth variation of waveform rep-rates without waveform table reloads. Per-channel divisors allow simulation of fractional "gear-ratio" waveshapes. Output stage analog summing allows mixing of up to four waveforms.

The V375 extends output bandwidth, adds inputs, and a burst mode.



FEATURES:

- 64 to 65,536 discrete points per waveform at up to 15 MHz
- Independent or synchronized channel operation
- 32-bit frequency and 16-bit amplitude resolution
- Four TTL-level sync pulses, two TTL-level aux logic inputs
- Output parameters smoothly alterable in real time
- Multi-board synchronization up to 64 channels

For more information, contact info@highlandtechnology.com.

RSC #6001 @www.vmebus-systems.com/catalogrsc

VXI Technology, Inc.

2031 Main Street

Irvine, CA 92614

Tel: 949-955-1894 • Fax: 949-955-3041



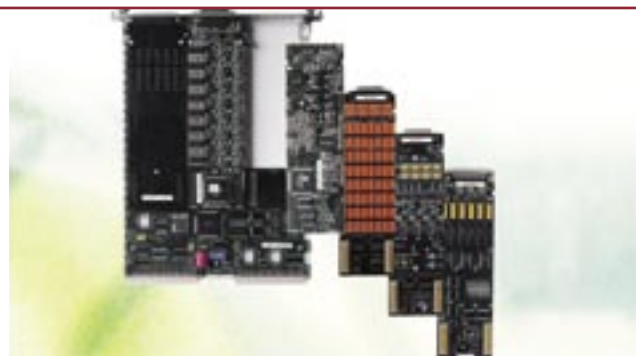
VMIP Instrumentation

www.vxitech.com

VXI Technology designs and develops high-performance instrumentation and switch systems with a focus on density, modularity, and price/performance. The VXI Modular Instrumentation Platform (VMIP™) is an open platform that offers high-density, modular instrumentation designed for demanding functional test applications.

Our modular design philosophy enables the user to mix and match multiple instruments, of the same or different type, without compromising performance. Up to three independent instruments can be installed per slot. Select from High-Speed Digitizers, Signal Sources, ARBs, DMMs, Counters/Timers, Comparators, Communications Interfaces, and much more.

Visit www.vxitech.com today.



FEATURES:

- Modular, scalable, high-performance instrumentation
- Three independent VMIP instruments per slot
- Reduced size and weight for increased portability
- Extensive synchronization, triggering, and control
- VXI plug&play drivers simplify programming tasks
- Open platform facilitates unique user designs

For more information, contact sales@vxitech.com.

RSC #6002 @www.vmebus-systems.com/catalogrsc

ITCN

591 Congress Park Dr.

Dayton, OH 45459

Tel: 937-439-9223 • Fax: 937-439-9173

**ST 201 VME Data Monitor**www.itcninc.com

This VME module, powered by ITCN's Real-Time Trace technology, is capable of monitoring and recording activity on all four VME backplane buses (Data Transfer Bus (DTB), Arbitration Bus, Interrupt Bus, and Utility Bus). This allows the analysis of data transfers between processors or any other device that participates in data transfers and VME bus arbitration.

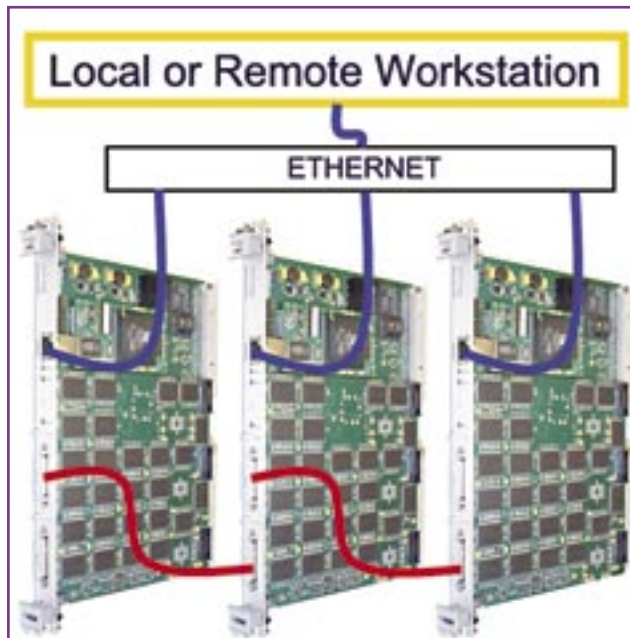
VME protocol interactions can be analyzed by specifying occurrences on the Arbitration, Utility, and Interrupt buses as Events for the module to monitor and record.

Any specific occurrence or group of occurrences on the bus may be recorded by setting up the module to identify them as Events and selecting the Recording Action.

Conditions for Event recording may be set up by the user, such as number of Event occurrences, elapsed time, or a dependence on the occurrence of other Events. An Event may be designated as a Pre- or Post-triggering point for a recording. Activity on the Data Transfer Bus may be recorded as a Range Event or a Variable Event. Activity on the Utility, Interrupt, and Arbitration buses are recorded as Special Events.

In addition to Event capture, a parallel circular History buffer with a 256K window may be enabled allowing the VME Probe to collect all activity from the time the target is powered up until the History buffer is triggered or the monitor is stopped.

After the completion of monitoring sessions, the bus data collected may be uploaded and then displayed by the GUI Analysis program.

**FEATURES:**

- Simultaneous real-time, non-intrusive monitoring of up to 32 VME chassis
- Monitors A64, A40, A32, A24, A16; D32, D16, D08 (EO); MBLT, M32, BLT
- Long-term data acquisition and storage (20GB per module 800M Events)
- Time-correlated data collection
- Up to 256 Unique Events collected per session
- Local or remote setup and control via ETHERNET (10/100Base-T) TCP/IP
- Run-time data displays
- 8 cross module triggers
- Complex triggers and filters (64 Level State Machine)
- Programmable data collection scenarios
- Open data interface
- Support for LabVIEW

CAEN spa

Via Vetraia, 11

Viareggio (LU), Italy - 55049

Tel: +39 0584 388398 • Fax: +39 0584 388959

CAEN
Tools for Discovery
V1718 VME-USB2.0www.caen.it

V1718 offers a very simple and low cost solution for PC-based VME control: a VME-to-USB2.0 bridge.

The V1718 is a 6U one-unit-wide module, which can perform the cycles foreseen by the VME64 bus: RW, RMW, BLT, MBLT, IACK, ADO, and ADOH. The front panel hosts an 88-LED data-way display, plus five outputs and two inputs on LEMO 00 connectors freely programmable (e.g., monitor of DS AS DTACK BERR, Location Monitor, ...). Moreover, it can perform functions like: I/O register, timer and pulse generator, scaler, and coincidence.

Firmware is upgradable via USB; software supports Windows 98/2000/XP and Linux. CAEN provides libraries in C, Visual Basic, and Lab View, and a very simple and user-friendly example program.

**FEATURES:**

- VME64/64X; VME Master/Slave; System Controller
- No boot required, ready at power-ON
- VME: A16, A24, A32, CR-CSR; D8, D16, D32, D64
- Front-panel display; seven programmable I/O NIM/TTL
- USB2.0; up to 30 MB/s sustained transfer rate
- Software: Windows/Linux; LabView, VB, C/C++

For more information, contact info@caen.it.RSC #6201 @www.vmebus-systems.com/catalogrsc**CAEN spa**

Via Vetraia, 11

Viareggio (LU), Italy - 55049

Tel: +39 0584 388398 • Fax: +39 0584 388959

CAEN
Tools for Discovery
V2718-A2818 VME-PCIwww.caen.it

The VME-PCI Bridge offers an advanced solution for VME control. It exploits the high speed of PCI and optical link technologies and permits control of up to eight crates from a single PCI slot. The bridge consists of a VME module (V2718), a PCI card (A2818), and an optical fibre connector. For multi-crate control, each crate requires one V2718. Connecting them in a daisy chain builds a CONet (Chainable Optical Network), which interfaces the single A2818 to each V2718.

V2718 is 6U, one-unit wide, and features the same characteristics of the VME-USB Bridge V1718: it performs the cycles of VME64, hosts an LED display and seven programmable I/O, supports Windows/Linux, and includes libraries and an example program.

**FEATURES:**

- VME64/64X; VME Master/Slave; System Controller
- No boot required, ready at power-ON; daisy chain capability
- VME: A16, A24, A32, CR-CSR; D8, D16, D32, D64
- Front-panel display; seven programmable I/O NIM/TTL
- PCI 33MHz; up to 50 MB/s sustained transfer rate
- Software: Windows/Linux; LabView, VB, C/C++

For more information, contact info@caen.it.RSC #6202 @www.vmebus-systems.com/catalogrsc

Annapolis Micro Systems, Inc.

190 Admiral Cochrane Drive, Suite 130

Annapolis, MD 21401

Tel: 410-841-2514 • Fax: 410-841-2518

**24 GSPS A/D CPD System**www.annapmicro.com

The Annapolis COTS Turnkey 24 GSPS Analog to Digital Collection, Processing, and Distribution (CPD) System clocks and synchronizes up to 16 channels of 1.5 GSPS A/D input (with 8-bit resolution) or up to eight channels of 3.0 GSPS A/D input (with 8-bit resolution), provides user configurable continuous sustained processing for all 24 GSPS, and streams all the data out to disk in real time.

The system consists of our A/D Clock Sync Distribution Board, one or more Dual 1.5 GSPS A/D Boards, one or more processing intensive WILDSTAR II Pro Processing Boards, one or more of our high-performance WILD Output Cards (including Fibre Channel 2), and a host processor board, all residing in a VME chassis.

The system is user programmable, configurable, and fully scalable to project requirements. Up to five Xilinx Virtex II Pro FPGAs per VME slot provide ample user programmable processing power. All the elements of the system are available from Annapolis as Commercial-Off-the-Shelf (COTS) products.

Our A/D Clock Sync Distribution Board can generate a high precision clock or accept a single-ended or differential input clock provided by the user. All the A/D channels are triggered at the same time and sample the data on the same clock.

Preliminary measurements on the A/D Clock Sync Board indicate Periodic Jitter is less than 2 picoseconds. Clock Skew is +/- 5 picoseconds. Cycle-to-Cycle Jitter is approximately 2.6 picoseconds, TIE Jitter time is approximately 1.0 pico seconds, and Peak-to-Peak Jitter is 12.5 picoseconds.

Our Dual 1.5 GSPS A/D I/O Card provides up to two channels of 1.5 GHz or one channel of 3.0 GHz sampled data with 8-bit resolution. It has a Xilinx Virtex II Pro 70 FPGA and a choice of input options, including balun, differential, transformer, and transistor, as well as an ADC range of either 600 MHz to 1 GHz or greater than 1 GHz.

**FEATURES:**

- Clock and synchronize up to 16 channels of 1.5 GSPS with 8-bit resolution
- Continuous real-time data collection at up to 24 GSPS
- Continuous real-time data processing of full 24 GSPS
- Full bandwidth distribution of raw and processed data
- COTS turnkey system – user configurable and scalable
- WILDSTAR II Pro for VME has up to three Xilinx Virtex II Pro 70 or 100 FPGAs
- WILDSTAR II Pro for VME carries up to two A/D or other I/O cards – up to 5 FPGAs/slot
- Fibre Channel 2, WILDSTAR data port, Gbit Ethernet, and other outputs available
- Full CoreFire FPGA application support with more than 800 IP Cores
- Achieve world class performance – WILD solutions outperform the competition
- Includes one-year HW warranty, SW updates, and customer support
- Training classes and application support also available

Annapolis Micro Systems, Inc.

190 Admiral Cochrane Drive, Suite 130

Annapolis, MD 21401

Tel: 410-841-2514 • Fax: 410-841-2518

**WILDSTAR II Pro for VME**www.annapmicro.com

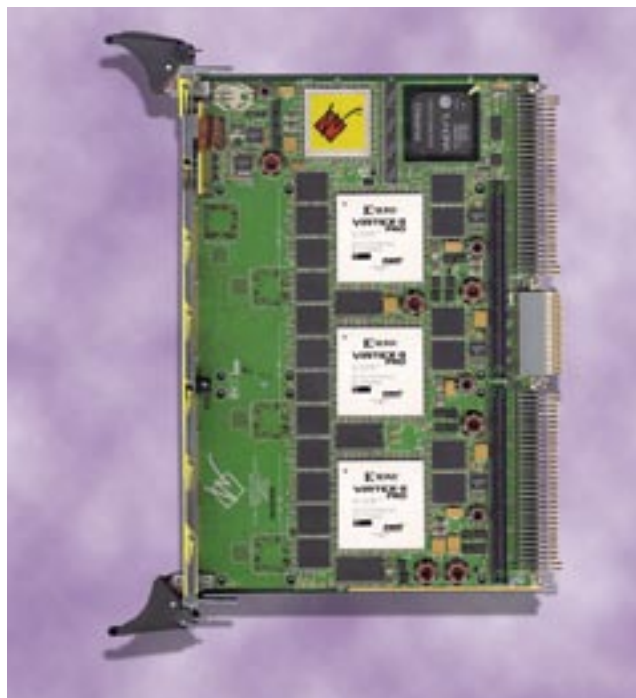
World leader in high-performance COTS FPGA-based processing products for radar, sonar, SIGINT, ELINT, digital signal processing, FFTs, communications, software radio, encryption, image processing, prototyping, text processing, and other processing intensive applications.

Our ninth-generation WILDSTAR II Pro for VME uses Xilinx's newest Virtex II Pro FPGAs for state-of-the-art performance. It accepts up to two I/O cards in one VME64X slot, including Dual 1.5 GHz A/D, Single 1.5 GHz A/D, Quad Fibre Channel 2, Quad 105 MHz, Quad Gigabit Ethernet, WILDSTAR Data Port (WSDP), FPDP, and LVDS.

We host our boards on a large number of operating systems, including Win (NT, 2000, XP), Linux, DEC Alpha, Solaris, IRIX, MacOS, and VxWorks. We support our board products with a standardized set of drivers, APIs, and VHDL simulation models. We also offer training, including customized application development and customer support.

Develop your application very quickly and easily with our CoreFire™ FPGA Application Builder, which transforms the FPGA development process, making it possible for theoreticians to easily and quickly build and test their algorithms on the real hardware that will be used in the field. CoreFire is based on data flow and automatically generates distributed control fabric between cores. Our extensive IP and board support libraries contain more than 800 cores, including floating point and the world's fastest FFT. CoreFire uses a graphical user interface for design entry, supports hardware-in-the-loop debugging, and provides proven, reusable, high-performance IP modules.

WILDSTAR II Pro for VME, with its associated I/O cards, provides extremely high overall throughput and processing performance. The combination of our COTS hardware and CoreFire allows our customers to make massive improvements in processing speed, while achieving significant savings in size, weight, power, person-hours, dollars, and calendar time-to-deployment.

**FEATURES:**

- 1-3 Virtex II Pro Xilinx FPGA processing elements
 - XC2VP70 or XC2VP100
- Up to 144 MBytes DDRII or QDRII SRAM
- Up to 384 MBytes DDR DRAM
- Programmable Flash for each processing element to store FPGA images
- Works with VME64X backplane
- High-speed DMA multichannel PCI controller
- Host software: Win NT, 2000 & XP, Linux, VxWorks, Solaris, MacOS, DEC Alpha, IRIX
- Full CoreFire board support package for fast easy application development
- VHDL model, including source code for hardware interfaces
- Save time and effort and reduce risk with COTS boards and software
- Achieve world-class performance – WILD solutions outperform the competition
- Includes one-year hardware warranty, software updates, customer support; training available

Tundra Semiconductor Corporation

603 March Road

Ottawa, ON K2K 2M5 Canada

Tel: 613-592-0714 • Fax: 613-592-1320



Tundra Tsi148™

www.tundra.com

The Tundra Semiconductor Corporation (Tundra) Tsi148 device is the next generation component in our industry leading, high-performance VMEbus system interconnect product family. The Tsi148 is fully compliant with the 2eSST and VME64 Extension standards. This enables you to take advantage of the higher performance VME protocols, while preserving your existing investment in VME boards that implement legacy protocols.

The Tsi148 increases a system's usable bus bandwidth because its local bus interface is designed for the next generation of PCI/X processors and peripherals that support either a 66-MHz PCI bus or a 133-MHz PCI-X bus interface.

The Tsi148 eases design constraints of VME Single Board Computers (SBCs) by requiring less board real estate and power than the previous generation of VME-to-PCI/X bridge components.

These capabilities make the Tsi148 a key building block of the VME Renaissance and next generation VME SBCs.

VME Renaissance

The VME Renaissance is a term defined by Motorola™ that describes an intense period of intellectual activity and technology infusion focused on the VMEbus. The VME Renaissance is a period of innovation and performance improvement that maintains backwards compatibility to legacy VMEbus standards. This compatibility requirement protects existing customer investments.

VME Renaissance gives VME a faster parallel backplane interconnect, a switched serial interconnect on the backplane, coincident with the traditional parallel interconnect, point-to-point mezzanines on the cards, and many other significant innovations.

Typical Application – Single Board Computers

The Tsi148 can be used on VME-based SBCs that employ PCI/X as their local bus. These SBC cards support a variety of market segments, including: telecommunications, data communications, medical, industrial automation, and military equipment.

The Tsi148 high-performance architecture seamlessly bridges PCI/X and VME buses.



FEATURES:

- Legacy protocols to protect existing VME investment
- VME64 Extensions
- 2eVME and 2eSST protocols to bring support for higher bandwidth
- Full VMEbus system controller functionality
- Interrupt and interrupt handling capability
- Flexible register set; programmable from both the PCI/X bus and VMEbus
- Provides 8x increase in usable bus bandwidth over existing solutions
- Fully compliant, programmable PCI or PCI/X bus interface
- 64-bit data path
- 32-bit or 64-bit addressing and data in PCI and PCI/X modes
- IEEE 1149.1 Interface
- 456 PBGA package, 1.0 mm ball pitch, 27 mm x 27 mm size

For more information, contact sales@tundra.com.

RSC #65 @www.vmebus-systems.com/catalogrsc

Motorola Computer Group

2900 S. Diablo Way

Tempe, AZ 85282

Tel: 800-759-1107 • Fax: 602-438-3699



Motorola VME Products

www.motorola.com/computer

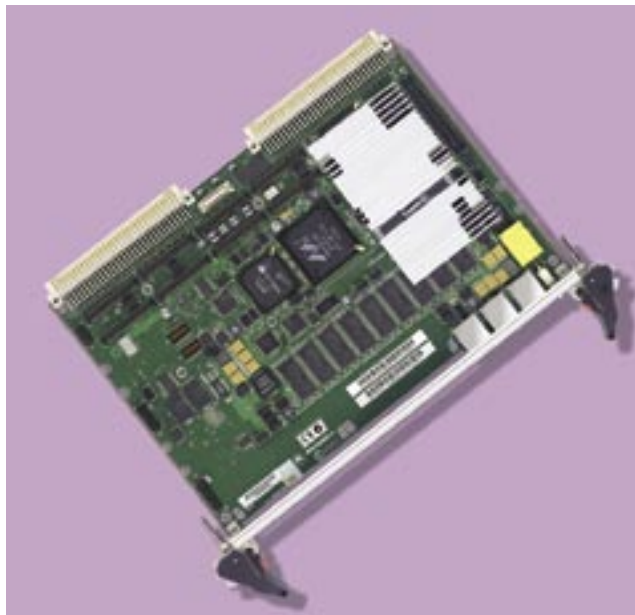
The VME Renaissance, led by Motorola, is enhancing the performance and capabilities of VMEbus systems. The VMEbus technology roadmap has a pathway that can take you beyond 30 GB/s in a VMEbus system. The open architecture of VMEbus provides a scalable platform that meets a variety of application demands. Compatibility between generations of VMEbus products allows you to preserve your investment, minimizing development costs during the upgrade process. VME Renaissance technology enhancements are backwards compatible so you can integrate the latest technology with your legacy products.

The Motorola MVME5500 series incorporates the MPC7455 PowerPC® processor at speeds of 1 GHz and beyond.

AltiVec™ coprocessor technology equips the MPC7455 to handle the most intensive data transformation tasks. The MVME5500 maximizes the overall performance and data throughput of the processor, memory, local buses, and I/O subsystems. It offers Gigabit and 10/100BaseTX Ethernet interfaces and two serial ports. The MVME5500 offers a straightforward migration path for users of Motorola legacy VMEbus products who require a performance or functionality upgrade.

The Motorola MVME6100 series is the first VMEbus SBC designed with the Tundra Tsi148 VMEbus interface chip offering two-edge source synchronous transfer (2eSST) VMEbus performance. The 2eSST protocol helps enable the VMEbus to run at a practical bandwidth of up to 320MB/s. Customers looking for a technology refresh, while maintaining backwards compatibility with their existing VMEbus infrastructure, can upgrade to the MVME6100 and take advantage of its enhanced performance features. The MVME6100 supports a variety of real-time operating systems and kernels. A VxWorks board support package and Linux support are available.

The MVME5500 and MVME6100 are designed to meet the needs of OEMs servicing the defense and aerospace, industrial automation, and medical imaging market segments.



FEATURES:

MVME5500

- 1 GHz MPC7455 processor with AltiVec technology and Discovery I chipset
- Up to 512MB on board memory, up to 1GB memory with add-on memory mezzanine
- Gigabit and 10/100 Ethernet with either front or rear access
- Two 32/64-bit, 33/66 MHz PMC expansion slots with front panel and P2 I/O
- Two banks of Flash memory, 32MB and 8MB

MVME6100

- 1.267 GHz MPC7457 processor with AltiVec technology and Discovery II chipset
- 2eSST VMEbus protocol with 320MB/s transfer rate across the VMEbus
- Up to 2GB of onboard DDR ECC memory
- Dual Gigabit Ethernet interfaces with either front or rear access
- Two 33/66/100 MHz PMC-X expansion slots with front panel and P2 I/O

Dynatem, Inc.

23263 Madero, Suite C

Mission Viejo 92691, CA 92691

Tel: 800-543-3830 • Fax: 949-770-3481

**DHC**www.dynatem.com

The DHC brings a high-performance x86 platform based on the Low Voltage Xeon™ processor to the VMEbus. The high-speed E7500 chipset supports a PCI-X expansion bus that can fully utilize the two Gbps Ethernet ports available on the DHC with no data transfer bottleneck. The two 1000BaseTx ports, a VGA port, and two USB connectors are all accessible from the front panel. Onboard CompactFlash permits single-slot booting. Conventional PC I/O is available with the rear I/O module, and the second slot PMC expansion module permits I/O tailoring to users' application requirements. The DHC supports network boot.

**FEATURES:**

- LV Xeon™ processor at 1.6, or 2.0
- System bus bandwidth of 3.2 GBps (400 MHz)
- Single-slot VMEbus operation
- DRAM: 144-bit wide, DDR-200
- One Intel 82546 single-chip Ethernet controller
- Support for WindowsXP, Linux, VxWorks, QNX, etc.

For more information, contact sales@dynatem.com.RSC #6701 @www.vmebus-systems.com/catalogrsc**Dynatem, Inc.**

23263 Madero, Suite C

Mission Viejo, CA 92691

Tel: 949-855-3235 • Fax: 949-770-3481

**DMC**www.dynatem.com

The DMC was designed to provide as much flexibility and functionality as possible in a single VMEbus slot. It was designed for the OEM who needs the maximum performance in the least number of slots at the lowest possible cost. The key to the design was to offer two PMC sites on a single-slot board without giving up the most standard I/O, including SVGA, Ethernet ports, IDE, floppy, keyboard/mouse, parallel and serial I/O, and USB. The 815E chipset was selected because it supports a broad array of features in a compact space. These functions include SVGA (built-in 3D graphics of resolutions up to 1600 x 1200), and Ultra ATA 100/66/33 IDE protocol. The DMC supports network boot.

**FEATURES:**

- Pentium III
- Support for WindowsXP, Linux, VxWorks, QNX, etc.
- Bootable Compact Flash
- Single-slot VMEbus operation
- SVGA
- Two available PMC expansion slots

For more information, contact sales@dynatem.com.RSC #6702 @www.vmebus-systems.com/catalogrsc

GE Fanuc – Embedded Systems

12090 South Memorial Parkway

Huntsville, AL 35803

Tel: 256-880-0444 • Fax: 256-882-0859



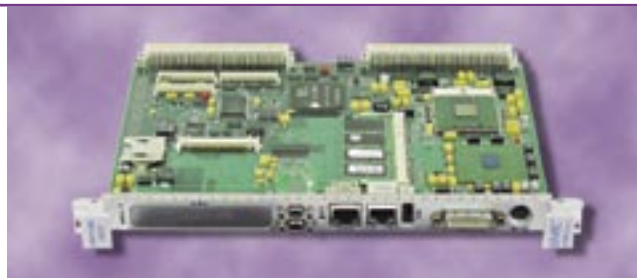
Embedded Systems

VMIVME-7805

www.gefanuc.com/embedded

The VMIVME-7805 is a 6U, single-slot VME SBC integrating the Pentium 4 Processor-M and 852GME chipset into a robust solution for bandwidth-intensive applications. The SBC features speeds up to 2.2 GHz with 512 KB of L2 cache, a 400-MHz system bus and up to 1 GB PC1600 DDR SDRAM. The front-panel digital video interface (DVI-I) supports digital and analog display and provides high-resolution graphics and multimedia video.

Features of the VMIVME-7805 include a PMC expansion site, 1 x 10/100/1000BaseTx and 1 x 10/100BaseTx Ethernet ports, 2 x USB 2.0 ports, two serial ports, Ultra DMA/100 hard drive and floppy drive controllers, and up to 1 GB of CompactFlash. OS support: Windows NT/2000/XP, Linux, QNX, and VxWorks.



FEATURES:

- Intel Pentium 4 Processor-M at 1.7 GHz or 2.2 GHz
- Up to 1 GB DDR SDRAM
- Onboard: 2 x Ethernet, 2 x USB 2.0, 2 x serial
- PMC site for additional I/O options
- Integrated SVGA and front panel DVI-I
- Hard drive, floppy controllers, 1GB CompactFlash

For more information, contact info.embeddedsystems@gefanuc.com.

RSC #6801 @www.vmebus-systems.com/catalogrsc

GE Fanuc – Embedded Systems

12090 South Memorial Parkway

Huntsville, AL 35803

Tel: 256-880-0444 • Fax: 256-882-0859



Embedded Systems

VMIVME-7810

www.gefanuc.com/embedded

The VMIVME-7810 is a high-performance, dual-slot, Intel Pentium M SBC with 1 MB L2 Advanced Transfer Cache, a 400-MHz system bus, Micro-ops fusion, dedicated stack manager capabilities, and advanced instruction prediction capability. These features are incorporated specifically to increase performance and throughput while reducing power demands. The two PMC expansion sites utilize the PCI-X bus to provide higher I/O bandwidth than previously available in a VMEbus SBC. The PCI-X bus provides up to 1 GB/s bandwidth to support high speed I/O devices such as Fibre Channel, Gigabit Ethernet, SCSI, Reflective Memory, and InfiniBand. OS support includes Windows NT/2000/XP, Linux, QNX, and VxWorks.



FEATURES:

- Intel Pentium M processor at 1.1 GHz or 1.6 GHz
- Up to 4 GB DDR1600 (200 MHz) memory
- Two 133/100/66-MHz PCI-X PMC expansion sites
- 2 x 10/100/1000BaseTx Ethernet plus dual channel SCSI
- SVGA/DVI-I with up to 1600 x 1200 resolution
- Real-time endian conversion hardware

For more information, contact info.embeddedsystems@gefanuc.com.

RSC #6802 @www.vmebus-systems.com/catalogrsc

Interface Concept

Z.I. N°2 des Pays-Bas

F-29510 Briec De L'Odét, France

Tel: + 33 (0)2 98 573 030 • Fax: + 33 (0)2 98 573 000



pLinesE-VMEa

www.interfaceconcept.com

pLinesE-VMEa is a VME Single Board Computer for communication and processing applications in the defense, industrial, and telecom markets. Power consumption has been optimized for embedded environments. Based on a PowerQUICCII, it provides four high-performance and versatile serial ports, four asynchronous serial ports, and three Fast Ethernet channels. Serial port modes (V10, EIA530, and RS-232/4xx) are software configurable.

The board's versatile features are increased by a PMC slot and an FPGA for specific customer requirements. Software support includes firmware (boot, built-in test, and debug services), and BSP for VxWorks and Linux. In-house protocol support includes HDLC, BiSync, framed asynchronous drivers and LLC, and TCP/IP network stack.



FEATURES:

- PowerQUICCII up to 450 MHz
- Four asynch/synch and four asynchronous channels
- Three Fast Ethernet 10/100Base-Tx ports
- VME master/slave/controller
- PMC mezzanine expansion slot
- Up to 128 MB SDRAM/16 MB Flash/128 KB SRAM

For more information, contact info@interfaceconcept.com.

RSC #6901 @www.vmebus-systems.com/catalogrsc

TEWS TECHNOLOGIES

1 E. Liberty Street, 6th Floor

Reno, NV 89504

Tel: 775-686-6077 • Fax: 775-686-6024



TPMC862-10

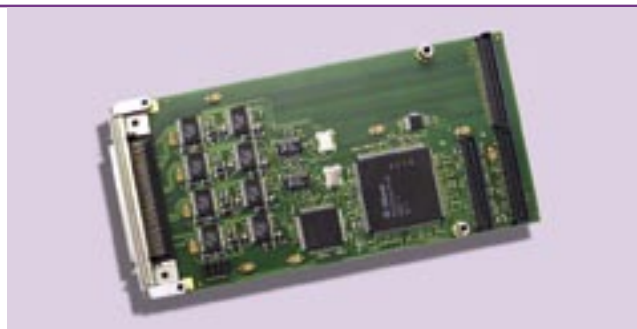
www.tews.com

The TPMC862-10 is a standard single-width 32-bit PMC with four high speed serial data communication channels based on the Infineon PEF 20534 DMA Supported Serial Communication Controller (DSCC4) with integrated bus master PCI interface.

Each channel supports serial communication protocols such as HDLC, SDLC, PPP, asynchronous, monosynchronous, and bisynchronous.

Multiprotocol transceivers are used for the line interface. The physical interface can be individually software selected for each channel as EIA-232, EIA-422, EIA-449, EIA-530, EIA-530A, V.35, V.36, or X.21.

Software driver support for VxWorks, Windows, WindowsNT, Linux, QNX, OS9, pSOS+, and LynxOS is available.



FEATURES:

- Standard single-width 32-bit PMC module
- Four high-speed synch/asynch serial channels
- Front panel and P14 rear I/O
- 10 Mbit/s maximum synch, 2 Mbit/s maximum asynch
- Temperature range: -40°C to +85°C
- Software driver support

For more information, contact usasales@tews.com.

RSC #6902 @www.vmebus-systems.com/catalogrsc

DNA Computing Solutions

1240 E. Campbell Road

Richardson, TX 75081

Tel: 972-671-1972 • Fax: 972-671-1581



EAGLE I

www.dna-cs.com

The EAGLE Series is a new paradigm for heterogeneous computing that integrates PowerPCs and FPGAs on a 6U VME board. With a performance density improvement of up to 10 times the conventional multiprocessor board and extremely high computational throughput, the EAGLE I™ translates into less space, less power, lower cost, and higher reliability. The EAGLE I is designed to work within the framework of DNA's WingSpan™ integrated software development environment, which includes extensive AltiVec optimized libraries. With the industry's lowest VME power requirements per gigaflop and extensive use of designed-in board and components testing, the EAGLE I obtains new levels of performance.



FEATURES:

- Real-time reconfigurable FPGA implementation
- Tightly-coupled FPGA & PPC heterogeneous design
- 22+ GFLOPs sustained per board
- Integrated software development environment
- Expansive algorithm libraries for FPGAs and PPCs
- VxWorks and Linux operating systems

For more information, contact sales@dna-cs.com.

RSC #7001 @www.vmebus-systems.com/catalogrsc

Transtech DSP

Suite 275, 171 E. State St., Box 120

Ithaca, NY 13077

Tel: 607-272-5494 • Fax: 607-272-5498



VPF1

www.transtech-dsp.com

The Transtech VPF1 is a COTS processing engine that combines the capabilities of two Xilinx Virtex-II Pro FPGAs, two PowerPC 7447 CPUs, and a multichannel communications fabric on a rugged VME/VXS board. The VPF1 targets demanding applications that require complex signal processing with closely coupled high-bandwidth data I/O.

The FPGAs on the VPF1 are connected via four RocketIOs. The balance of the CPUs connect with the VITA41/VXS connector on the VME P0. A Marvell Discovery II device tied to each PowerPC handles PowerPC/FPGA connectivity.

Connectivity between VPF1s and other devices via VXS is achieved by loading the appropriate IP core.

Support for Linux and VxWorks is supplied.



FEATURES:

- Dual 1-GHz+ PowerPC 7447 CPUs
- Two Xilinx XC2VP70 Virtex-II Pro FPGAs
- Eight 2.0-3.125 Gbit/sec off-board serial channels
- Air-cooled and rugged conduction-cooled builds
- 64-bit/66-MHz PMC site
- Built-in test (BIT), Ethernet, RS-232/422

For more information, contact sales@transtech-dsp.com.

RSC #7002 @www.vmebus-systems.com/catalogrsc

TEWS TECHNOLOGIES

1 E. Liberty Street, 6th Floor

Reno, NV 89504

Tel: 775-686-6077 • Fax: 775-686-6024

**TPMC362-10**www.tews.com

The TPMC362-10 is a conduction cooled 32-bit PMC with four high-speed serial data communication channels based on the Infineon PEF 20534 DMA Supported Serial Communication Controller (DSCC4) with integrated bus master PCI interface. All I/O is supported through P14.

Each channel supports serial communication protocols such as HDLC, SDLC, PPP, asynchronous, monosynchronous, and bisynchronous.

Multiprotocol transceivers are used for the line interface to allow individual software selection for each channel as EIA-232, EIA-422, EIA-449, EIA-530, EIA-530A, V.35, V.36, or X.21.

Software driver support for VxWorks, Windows, WindowsNT, Linux, QNX, OS9, pSOS+, and LynxOS is available.

**FEATURES:**

- Conduction cooled 32-bit PMC module
- Four high-speed synch/asynch serial channels
- P14 rear I/O
- 10 Mbit/s maximum synch, 2 Mbit/s maximum asynch
- Temperature range: -40°C to +85°C
- Software driver support

For more information, contact usasales@tews.com.RSC #7101 @www.vmebus-systems.com/catalogrsc**ELTEC Elektronik AG**

Galileo-Galilei-Strasse 11

55129 Mainz, Germany

Tel: +49 6131 918-0 • Fax: +49 6131 918-195

**BAB 760**www.eltec.com

The BAB 760 supports IBM's PowerPC 750 processor family, from the 600-MHz 750 FX to the 1-GHz 750 GX processor chip with 1 MB of L2 on-chip cache. The standard configuration is equipped with the 1-GHz CPU. The board is based on the Marvell Discovery I chipset with a memory controller for 133 MHz SDRAM and with PCI bus support for 64 bits at 66 MHz. Two onboard Ethernet controllers for 10/100 Mbps with front-panel connectors provide network connectivity and have four serial and one parallel interface ports. Hard disks are attached via IDE with an option for serial ATA. The interface allows 32-bit transfers. High-speed peripherals can be connected to the onboard PMC slot with 64-bit/66-MHz speed.

**FEATURES:**

- IBM PowerPC 750 GX at 1000 MHz
- Marvell Discovery I chipset
- Dual 10/100 Ethernet interface
- Onboard 64/66 PMC slot
- Onboard CompactFlash socket

For more information, contact info@eltec.com.RSC #7102 @www.vmebus-systems.com/catalogrsc

Dawn VME Products

47915 Westinghouse Drive

Fremont, CA 94539

Tel: 510-657-4444 • Fax: 510-657-3274



Model 426 System Monitor

www.dawnvme.com

Model 426 is a third generation "system health monitor and controller" board and the first product in Dawn's new micro-controller-based technology roadmap. Its diminutive size – 2" x 5.5" – results in saving system backplane slots and the associated expense.

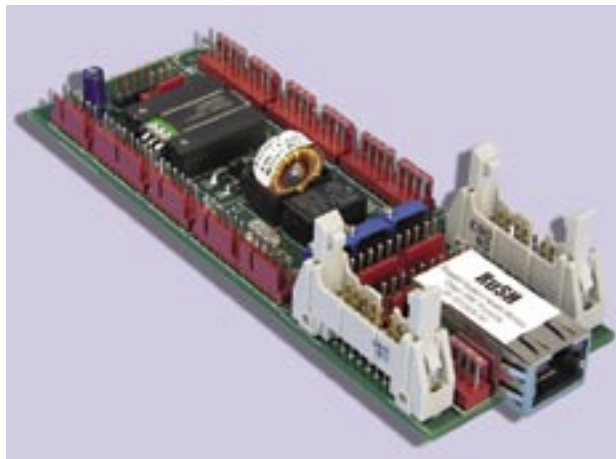
With "RuSH™" as its technology foundation, Model 426 is a highly programmable, bus independent board designed to monitor, control, and communicate environmental parameters of VME, VXI, CompactPCI, or custom chassis. Monitored parameters: chassis temperature, fan speed, power supply AC input and DC output voltages, and digital and analog peripherals connect directly to Model 426's I/O ports.

All operating conditions are continuously sent via onboard RS-232 and Ethernet ports.

When fault conditions occur, Model 426 will generate an audible alarm signal as well as transmit actual readings. If a temperature fault condition is detected, the board will automatically increase fan speed (RPM) while generating an alarm signal. Power supply fault conditions will also trigger alarm signals; it may also be shut down if this option was enabled during setup. Fan control is accomplished by a unique adaptive algorithm that self-characterizes the operating parameters. Output voltage limits may also be programmed into Model 426's onboard μ P that, when exceeded, cause the board to generate a fault signal.

Model 426 can be accessed from anywhere in the world via the Internet using a web browser or telnet program. One of the key benefits of Dawn's technology is its highly intuitive interface. Users can accept factory default values, simply type their own, or click selections from drop-down boxes. Dual password security is built into firmware and may be changed by the user.

Dawn offers Model 426 in most of its commercial and COTS chassis products. Customers may purchase a kit comprising the board, display, cables, and miscellaneous items for retrofitting into most existing chassis.



FEATURES:

- Dawn's technology allows users to accept factory defaults or input others
- Onboard RS-232 and Ethernet ports provide local/remote communications
- Communicate with Model 426 via the Internet or Microsoft's HyperTerminal
- Two levels of password security
- E-mail client sends three messages in the event of any fault condition
- Monitors chassis temperature, fan operation, and power supply DC outputs
- Controls fan speed, power supply, backplane RESET, and output relay output
- Fault condition can automatically shut down single or dual power supplies
- Embedded form-factor PCB = low-cost implementation
- Alphanumeric Polymeric LED or LCD display
- 1-200mA output for driving audible alarms
- Relay output provides 250VAC/250mA capability for driving heavier loads

Elma Electronic

44350 Grimmer Blvd.

Fremont, CA 94538

Tel: 510-656-3400 • Fax: 510-656-3783



Elma VXS Chassis

www.elma.com

Elma's high-quality VXS chassis is based on a Type 12V platform and is compliant with the VITA 41 standard. The type 12V is more rugged than other standard constructions and provides superior EMC shielding. Designed for 19" rackmount use, the 9U height maximizes cooling, functionality, and size. It's available in 5, 12, and 20-slot versions and comes with a recessed card cage. The system accommodates 6U x 160mm boards and is fully wired and tested prior to shipment.



FEATURES:

- 19" rackmount compliant with Eurocard and IEEE standards
- Compliant with VITA 41.0, VXS switched fabric standards
- 9U high
- Advanced EMC shielding
- Single Star, Dual Star, Mesh, and Hybrid versions
- Custom configuration available

For more information, contact sales@elma.com.

RSC #73 @www.vmebus-systems.com/catalogrsc

SBS Technologies®

2400 Louisiana

Albuquerque, NM 87110

Tel: 505-875-0600 • Fax: 505-875-0400

**VME64 Bus Adapters**www.sbs.com

The new SBS VME64 bus-to-bus adapters are a cost effective solution for developers who have, or who are creating, applications requiring large amounts of data that must be transferred efficiently and at high speed.

SBS Technologies has a history of providing embedded systems engineers with unique bus adapters. The adapters allow each system's bus to operate independently, and bus bandwidth is only affected when a memory or I/O reference is made from one system to another, enhancing performance. Another feature is the adapter's unique memory mapping RAM. This allows any memory location on the VMEbus to be mapped in the address space of the other bus. For more information and to obtain a complete product listing of SBS' I/O and communication products, visit our website at <http://www.sbs.com/products/iocomm>.

**FEATURES:**

- VME64-to-VME64, PMC, PCI, and CompactPCI
- 70 MBps data transfers using Controller Mode DMA
- Transparent remote access with 2 microsecond latency
- Transparent Interrupt passing
- Drivers for Linux, VxWorks, Windows XP/2000, and more
- Fiber-optic cables allow distances of up to 500 m

For more information, contact info@sbs.com.RSC #7401 @www.vmebus-systems.com/catalogrsc**Aurora Technologies, Inc.**

10 Mupac Dr.

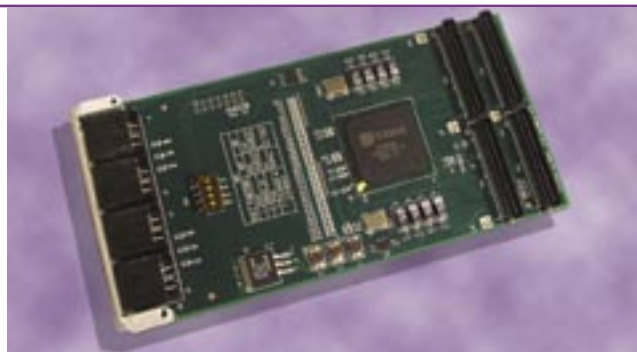
Brockton, MA 02301

Tel: 508-588-6110 • Fax: 508-588-0498

**StarFabric PMC-SB**www.auroratech.com

The PMC-SB offers a flexible switch fabric interface to real-time networks that scale from a few to hundreds of nodes. The flexibility and scalability of the PMC-SB is ideal for signal-processing applications that require the use of multiple processors to achieve real-time response and throughput.

The PMC-SB is PICMG 2.17 compliant and mounts on a CompactPCI or VME64 PMC carrier to provide a StarFabric interface. The PMC-SB converts a conventional parallel 32- or 64-bit PCI bus operating at up to 66 MHz to dual high-speed serial links compliant with the StarFabric protocol. The two links may be used separately for redundant fabric applications or may be aggregated for higher speed operation.

**FEATURES:**

- Incorporates StarGen's StarFabric-to-PCI bridge
- 32-bit/33 MHz, 64-bit/66 MHz PCI interface
- Two 2.5 Gbps or 5.0 Gbps bundled StarFabric links
- External RJ-45 connectors (shielded CAT5 cables)
- PICMG 2.17 compatible Pn4 interconnect
- Transparent protocol provides PCI-based OS

For more information, contact info@auroratech.com.RSC #7402 @www.vmebus-systems.com/catalogrsc

Pentek, Inc.

One Park Way
Upper Saddle River, NJ 07458-2311
Tel: 201-818-5900 • Fax: 201-818-5904

PENTEK**MPC7457 PowerPC SBC** www.pentek.com/go/vme4205

Model 4205 SBC VME board employs the latest AltiVec PowerPC with clock speeds to 1 GHz. It offers high-speed interfaces such as Fibre Channel, Gigabit Ethernet, and RACE++ and executes signal processing tasks with up to 9.0 GFLOPS processing power. The board is equipped with both PMC and VIM module sites and includes two Xilinx XC2V1000 or 3000 FPGAs that you can use for custom or preprogrammed signal processing applications.

Different data flow and control architectures for the FPGAs can be selected from a menu of built-in configurations. Custom algorithm development is easy with the Pentek GateFlow FPGA Design Kit. GateFlow IP and installed cores include FFTs, digital receivers, and more.

**FEATURES:**

- Onboard Xilinx Virtex-II FPGAs
- Fibre Channel, Gigabit Ethernet, and RACE++ I/F
- PMC and VIM module support
- VxWorks and eCOS software support
- Selectable data flow architecture and dual PCI buses
- One-slot system solutions

For more information, contact info@www.pentek.com.

RSC #7501 @www.vmebus-systems.com/catalogrsc

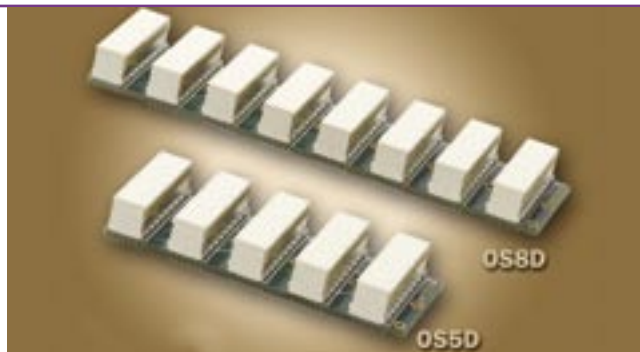
Synergy Microsystems, Inc.

9605 Scranton Road, Suite 700
San Diego, CA 92121
Tel: 888-479-6374 • Fax: 858-452-0060

SYNERGY
MICROSYSTEMS**Power Matrix**www.synergymicro.com

Power Matrix, Synergy's embedded, multi-computing platform, delivers high-density performance for today's emerging digital and image processing applications. It provides optimal processing efficiency based on its PowerPC G4, AltiVec-enhanced, GHz+ processor nodes and its high-speed, node-to-node communication via 200 MB/s StarFabric switch fabric interconnect technology.

Multi-computing topologies are formed using Synergy's "building block" approach combining dual or quad processor SBCs with StarFabric bridge/switch PMC modules. Cabling is eliminated by Synergy's P0 backplane overlay. Software modules include standards-based math, message-passing (MPI), and memory management (GBM) libraries.

**FEATURES:**

- PowerPC 7457 processing nodes up to 1.3 GHz
- 200 MB/s communication via StarFabric
- Hand-coded DSP math library with VSIPL support
- Global Buffer Manager (GBM) memory management
- Message Passing Interface (MPI) internode communication
- Interoperability of VxWorks, INTEGRITY, and Linux

For more information, contact sales@synergymicro.com.

RSC #7502 @www.vmebus-systems.com/catalogrsc

Concurrent Technologies

3840 Packard Road

Ann Arbor, MI 48108

Tel: 734-971-6309 • Fax: 734-971-6350



VP 305/01x and VP 307/01x

www.gocct.com

The VP 305/01x and VP 307x/01x families consist of four VME-based high performance, low-power single slot SBCs utilizing the Intel® Pentium® M processor. All boards have extensive front/rear I/O functionality and, as an option, can support VITA 31.1 (Gigabit Ethernet on VME64x backplanes). VITA 31.1 is an ANSI approved Ethernet-based switch fabric standard that is equivalent to the mature CompactPCI® PICMG 2.16 standard – VITA 31.1 uses standard off-the-shelf PICMG 2.16 switch fabric cards. All boards support up to 1.5 Gbytes of DDR ECC DRAM utilizing the ServerWorks GC-LE chipset. The VP 305/01x family supports either the 1.6 GHz or 1.1 GHz Intel Pentium M processor (with 1 Mbyte L2 cache) and the VP 307/01x supports the 1.8 GHz Intel Pentium M processor 745 (with 2 Mbytes L2 cache).

The 1.1 GHz VP 305/01x is available in two operating temperatures: 0°C to +55°C or –25°C to +70°C.

Supporting a PMC site and expansion for two more PMC sites (all with rear I/O), other rear I/O functions include dual Gigabit Ethernet, VITA 31.1, analog/digital graphics, keyboard, mouse, RS-232/422/485, USB, floppy, and EIDE interfaces. The front panel supports the PMC, analog graphics, keyboard and mouse interfaces, and includes additional front panel interfaces (separate from the rear I/O) for USB, RS-232/422/485, and Fast Ethernet.

To cater to embedded applications there are 32 Mbytes of Application Flash memory. For a wider range of applications, there is an EIDE P2 interface (up to UDMA100), plus installed EIDE options for an onboard EIDE 2.5-inch disk drive, CompactFlash™, or IBM/Hitachi Microdrive modules, all within a single slot. As well as the industry standard PC interfaces, other features available are a watchdog timer, long duration timer, and LAN boot firmware.

The VP 305/01x and VP 307/01x SBCs support many of today's leading operating systems, including VxWorks, Linux, Windows 2000, Windows NT, Windows XP, Windows XP Embedded, RTX, QNX, and MS-DOS.



FEATURES:

- 1.6 GHz or 1.1 GHz Intel Pentium M processor, 1 Mbyte L2 cache
- Or 1.8 GHz Intel Pentium M processor 745, 2 Mbytes L2 cache
- Up to 1.5 Gbytes DDR ECC DRAM (includes 512 Mbytes DRAM soldered)
- PMC site (on PCI 32/64 @ 33/66 MHz bus), 3.3V or 5V signaling
- Fast Ethernet and dual Gigabit Ethernet interfaces
- VITA 31.1 support, dual Gigabit Ethernet on VME64x backplanes
- VITA 31.1 features reap the benefits of a switch fabric architecture
- Graphics/keyboard/mouse interfaces via front panel and via P2 connector
- 2x RS-232/422/485 and 2x USB interfaces via front panel and P2 connector
- 32 Mbytes onboard Application Flash EPROM
- Optional extended operating temperature: –25°C to +70°C
- Single slot

Concurrent Technologies

3840 Packard Road

Ann Arbor, MI 48108

Tel: 734-971-6309 • Fax: 734-971-6350



VP 315/02x and VP 317/02x

www.gocct.com

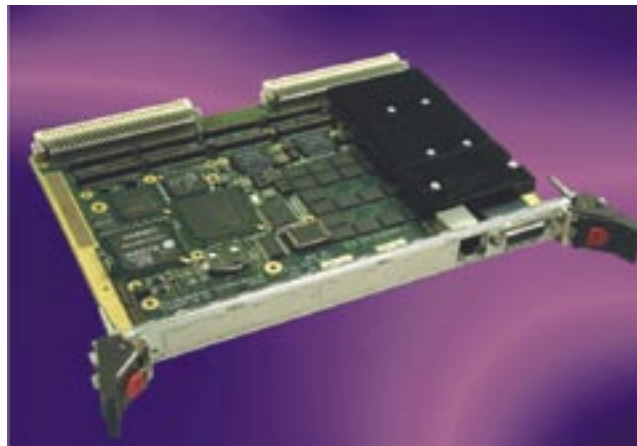
The VP 315/02x and VP 317/02x are seven VME-based, dual PMC, high-performance, low-power single slot SBCs utilizing the Intel® Pentium® M processor. The VP 315/02x supports either the 1.6 GHz or 1.1 GHz Intel Pentium M processor (with 1 Mbyte L2 cache), and the VP 317/02x supports the 1.8 GHz Intel Pentium M processor 745 (with 2 Mbytes L2 cache). All boards will support up to 1.5 Gbytes of DDR ECC DRAM utilizing the Intel® 855GME chipset. All boards have extensive I/O functionality and, as an option, can support VITA 31.1 (Gigabit Ethernet on VME64x backplanes). VITA 31.1 is an ANSI approved Ethernet-based switch fabric standard that is equivalent to the mature CompactPCI® PICMG 2.16 standard – VITA 31.1 uses standard off-the-shelf PICMG 2.16 switch fabric cards.

Specific boards are available in up to three operating temperatures: 0°C to +55°C, -25°C to +70°C, or -40°C to +85°C. A rugged, conduction cooled version is planned.

Supporting dual PMC sites, and expansion for two more PMC sites (all with rear I/O), other rear I/O functions include dual Gigabit Ethernet, VITA 31.1, analog/digital graphics, keyboard, mouse, 2x RS-232/422/485, 2x USB and EIDE interfaces. The front panel supports dual PMC, analog graphics, keyboard and mouse interfaces, and includes an additional RS-232 interface.

To cater to embedded applications, there are 64 Mbytes of Application Flash memory. For a wider range of applications, there is an EIDE P2 interface (up to UDMA100), plus installed EIDE options for an onboard EIDE 2.5-inch disk drive, CompactFlash™, or IBM/Hitachi Microdrive modules, all within a single slot. As well as the industry standard PC interfaces, other features available include a watchdog timer, long duration timer, and LAN boot firmware.

The VP 315/02x and VP 317/02x support many of today's leading operating systems, including VxWorks, Linux, Windows 2000, Windows NT, Windows XP, Windows XP Embedded, RTX, QNX, Solaris, and MS-DOS.



FEATURES:

- 1.6 GHz or 1.1 GHz Intel Pentium M processor, 1 Mbyte L2 cache
- Or 1.8 GHz Intel Pentium M processor 745, 2 Mbytes L2 cache
- Up to 1.5 Gbytes DDR ECC DRAM (soldered)
- Dual PMC sites (on PCI 32/64 @ 33/66-MHz bus), 3.3V or 5V signaling
- Dual Gigabit Ethernet interfaces
- VITA 31.1 support, dual Gigabit Ethernet on VME64x backplanes
- VITA 31.1 reaps the benefits of a switch fabric architecture
- Graphics/keyboard/mouse interfaces via front panel and via P0 connector
- 2x RS-232/422/485 and 2x USB interfaces
- 64 Mbytes onboard Application Flash EPROM
- Extended operating temperature versions: -25°C to +70°C or -40°C to +85°C
- Rugged, conduction cooled version planned

Molex Incorporated

2222 Wellington Court

Lisle, IL 60532

Tel: 630-718-5924 • Fax: 630-813-5924



Electrical Connector

www.molex.com

Molex supplies a wide range of connectors for VMEbus backplane and mezzanine applications.

DIN 41612 backplane connectors come in a wide range of standard and complementary types, including C, C/2, R, R/2, and M. The connectors are available with press-fit or solder tails of various lengths. Options include board locks, coding, and flux-proofing. The connectors are shipped in trays.

IEEE 1386 connectors enable the addition of mezzanine cards to VMEbus host boards. The connector design is hard metric, accommodates easy mating, is robust, surface mounted, and features high circuit density with excellent electrical performance. The IEEE 1386 connector is available in a range of stacking heights from 8.00 to 15.00mm (.315 to .591") for optimizing system function. The connectors are shipped in tubes or embossed tape packaging.



FEATURES:

- DIN connector UL 94V-0 glass-filled polyester
- FMLB/LMFB pins (extended/recessed) available
- 1386 has low mating force for reduced PCB stress
- UL 94V-0 LCP housings withstand SMT reflow process
- Used in arrays of 1 to 4 pairs for up to 256 ckt
- Other versions available on request

For more information, contact VMEbus@molex.com.

RSC #7801 @www.vmebus-systems.com/catalogrsc

Universal Switching Corporation

7145 Woodley Avenue

Van Nuys, CA 91406

Tel: 818-785-0200 • Fax: 818-785-0680



16x16 RGB Matrix

www.uswi.com

NEW from Universal Switching Corporation is the VXI-C1-sized 16 input, 16 output, full fanout DC-125-MHz RGB video matrix module (Model VXI-RGB3216). Designed for routing high-performance RGB video, the module can also support the routing of telemetry data including TTL, IRIG-B, and other similar signals. Sixteen RGB input signals are on the multi-coax connector and can be routed to any single, many, or up to all of the sixteen RGB outputs (full fanout). The module is register-based for fast control, and LabVIEW VISA drivers are available. This is one of many types of high-performance VXI modules available from Universal Switching Corporation spanning DC-40 GHz.



FEATURES:

- High-performance DC-125 MHz, 16x16 RGB matrix
- Compact VXI-C1 package with register-based control
- Quick connect multi-position coaxial connectors
- Non-blocking full fanout 16x16 matrix design
- Competitive pricing with quantity discounts
- Includes LabVIEW VISA drivers for fast integration

For more information, contact sales@uswi.com.

RSC #7802 @www.vmebus-systems.com/catalogrsc

GE Fanuc – Embedded Systems

12090 South Memorial Parkway

Huntsville, AL 35803

Tel: 256-880-0444 • Fax: 256-882-0859



RM920

www.gefanuc.com/embedded

The RM920 is a fully managed, Layer 2/3 VME Gigabit switch offering 12 (single slot) or 24 (dual slot) 10/100/1000 Ethernet ports. 10 and 20 ports respectively are routed to the front panel and can be provided in any even combination of Copper (RJ-45) and Fiber (LC) connectors. The other two or four ports are routed to the backplane. All the ports are switched ports. The RM920 is a high level solution with fully managed capability via SNMP or Telnet. The management software capabilities include: QoS on Layers 2/3/4 and 802.1p tag; deep packet filtering, Link Aggregation, 802.3ad, 802.1Q VLAN standard, Spanning Tree, Rapid Spanning Tree Protocol (RSTP), Broadcast Storm Control, and Port Mirroring.



FEATURES:

- 12 x 10/100/1000 Ethernet switch – single slot
- 24 x 10/100/1000 Ethernet switch – dual slot
- Multimedia: combination of copper/fiber
- Managed control via SNMP, Telnet, or Web server
- Fully integrated QoS software on Layers 2/3
- Full-wire speed

For more information, contact info.embeddedsystems@gefanuc.com.

RSC #7901 @ www.vmebus-systems.com/catalogrsc

Interface Concept

Z.I. N°2 des Pays-Bas

F-29510 Briec De L'Odet, France

Tel: + 33 (0)2 98 573 030 • Fax: + 33 (0)2 98 573 000



ComEth4100

www.interfaceconcept.com

ComEth4100, new Interface Concept GigaEthernet Switch, provides 9 or 10 10/100/1000Base-T ports (front or rear I/O). One port can be equipped with a 1000SX/LX optic interface. It is the ideal solution for PICMG 2.16, Vita31.1, or simply VME and CompactPCI systems. A conduction-cooled version allows GigaEthernet operation in rugged environments.

Designed for embedded systems, ComEth4100 is built on the latest generation Gigabit switch engine, combined with an optional PPC processor for management.

Autocrossover, autopolarity, autonegotiation, and automatic MAC@ management make it a true Plug&Play Layer 2 switch. Our switch implements a virtual cable tester reporting cable opens, shorts, and impedance mismatch.



FEATURES:

- Plug&Play Layer 2 switch
- The GigaEthernet at attractive price
- Easy, flexible, and fast implementation
- Extended management of QoS and bandwidth
- Consumption below 15W (10 active Gigabit ports)
- Remotely diagnose and report cable fault

For more information, contact info@interfaceconcept.com.

RSC #7902 @ www.vmebus-systems.com/catalogrsc

Force Computers

4211 Starboard Drive

Fremont, CA 94538

Tel: 510-624-5300 • Fax: 510-624-5301



Powercore CPU-695

www.forcecomputers.com

The PowerCore CPU-695 SBC harnesses the power of the PowerPC 750FX processor – at up to 800 MHz – and Marvell's latest system controller, the Discovery II, which features a high-speed 133 MHz front-side bus. Leveraging the performance of the Discovery II's five decoupled buses for concurrent processor and PCI device access to main memory, this board delivers outstanding embedded computing power and I/O capability through dual Gigabit Ethernet interfaces, dual PMC slots, and the largest ECC DDR-SDRAM memory available on a PowerPC processor-based VMEbus SBC. The PowerCore CPU-695 is the best choice for telecommunications, data communications, industrial control, and benign defense and aerospace.



FEATURES:

- PowerPC 750FX processor – up to 800 MHz
- Up to 4 GB high-speed DDR-SDRAM main memory
- 133 MHz front-side bus host interface
- Dual Gigabit Ethernet interfaces
- Dual PMC slots
- 64-bit Tundra Universe II VMEbus bridge

For more information, contact info@fci.com.

RSC #8001 @www.vmebus-systems.com/catalogrsc

Force Computers

4211 Starboard Drive

Fremont, CA 94538

Tel: 510-624-5300 • Fax: 510-624-5301



SPARC CPU-56 SBC

www.forcecomputers.com

The UltraSPARC-IIi+ processor-based CPU-56 SBC offers high performance and flexibility for embedded OEM applications. By providing superior functionality for applications such as benign defense and aerospace, medical, industrial control, communications, and other uses, the CPU-56 delivers the perfect fit solution. For OEMs looking for next-generation products to successfully implement VMEbus-based solutions for industrial, C3I, and communications networking applications, the CPU-56 provides state-of-the-art technology at the highest quality and the lowest total cost. The CPU-56 reduces time-to-market and power requirements using the latest processor from the Sun Microsystems roadmap.



FEATURES:

- UltraSparc-IIi+ 650 MHz, 512 KB L2 cache
- 512 MB onboard ECC-protected SDRAM, expandable
- Up to three Ultra-3 SCSI interfaces (LVD)
- One fast Ethernet interface
- Dual Gigabit Ethernet interfaces
- Optional onboard IDE hard disk drive

For more information, contact info@fci.com.

RSC #8002 @www.vmebus-systems.com/catalogrsc

Data Device Corporation

105 Wilbur Place

Bohemia, NY 11716

Tel: 631-567-5600 • Fax: 631-567-7358



FC-75000 Series

info@ddc-web.com

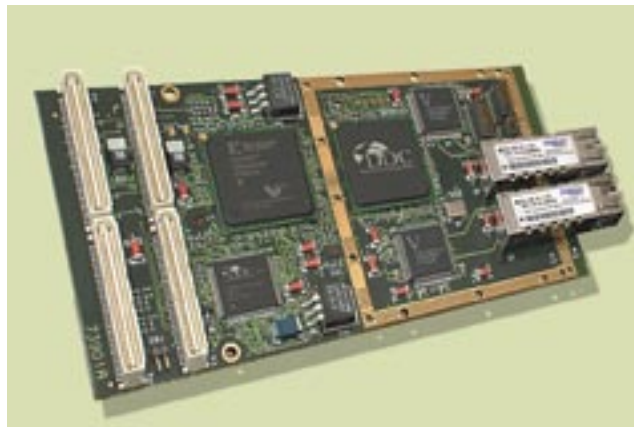
The FC-75000 FibreAccess series offers dual independent or dual redundant Fibre Channel ports on a PMC card optimized for use in military/aerospace applications. The FibreAccess Controller can operate at either 1 Gb/s or 2 Gb/s data rates in point-to-point, arbitrated loop or switched fabric topologies. FibreAccess cards are available with either electrical or optical interfaces on a conduction cooled PMC form factor.

DDC has developed the Fibre Channel engine to include valuable features for military data networking needs including a combination of autonomous scheduled, high priority unscheduled, and low priority traffic management. Additionally, DDC is well positioned to support long life cycles of its customers' systems with its own Intellectual Property (IP).

Based on DDC's own Fibre Channel technology, FibreAccess architecture is optimized to meet the highly deterministic performance, high reliability, and demanding environmental requirements of embedded, real-time military applications. Its flexible FPGA-based architecture can be tailored to meet a wide range of specific system requirements. Moreover, FibreAccess is not subject to rapidly changing commercial market forces that can result in shortened life cycles. Instead, DDC's FibreAccess technology has been designed to meet the multi-decade life cycle demands of military/aerospace programs, continuing DDC's demonstrated commitment as a long-term military COTS supplier of digital interface devices.

Applications

DDC's FibreAccess Controller is suitable for a wide variety of applications for embedded avionics and vetronics systems. These include sensor interfacing, multiprocessor and DSP arrays, radar systems, display systems, serial backplanes, and storage.



FEATURES:

- DDC-developed Fibre Channel technology to support customization and long life cycles
- 1 Gb/s or 2 Gb/s over fiber or copper
- -40°C to +85°C operation, shock and vibration resistant
- Multiple OS support, including VxWorks, Linux, etc.
- ASM, RAW, TCP/IP, and UDP/IP upper layer protocols
- Dual independent or dual redundant ports, autonomous failover, and loop healing
- 320 MB/s sustained throughput with memory-to-memory latency under 20 microseconds
- Support for class 2 and 3 service including broadcast and multicast

GET Engineering

9350 Bond Ave
El Cajon, CA 92021
Tel: 619-443-8295 • Fax: 619-443-8613

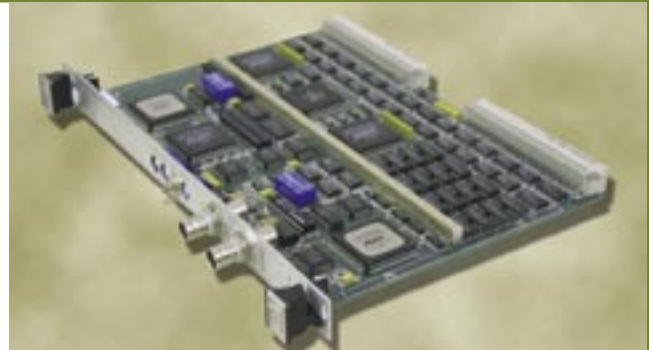


NTDS VME Adaptor

www.getntds.com

GET's VME Interface Adaptors offer the highest levels of performance and flexibility for interfacing to MIL-STD-1397C. GET offers VME serial boards in NTDS Type D or E. Parallel versions, A/B/C/H, include multiple configuration options such as rear I/O, front and rear I/O, and dual tap.

A 4-MB dual port RAM allows data buffers to remain on-board and not utilize VME bandwidth. Our onboard 68K processor gives users the ability to create a system emulator. GET VME boards not only include complimentary drivers for most operating systems, but also come standard with free firmware and software upgrades.



FEATURES:

- 100 percent MIL-STD-1397C compliant
- Parallel and serial configurations
- Full-duplex 16, or 32-bit transfers
- Software selectable NTDS configurations
- User programmable 68K CPU
- Drivers for most operating systems included

For more information, contact sales@getntds.com.

RSC #82 @www.vmebus-systems.com/catalogrsc

General Micro Systems, Inc. (GMS)

8358 Maple Place

Rancho Cucamonga, CA 91730

Tel: 800-307-4863 • Fax: 909-987-4863



P60x "4X4"

www.gms4sbc.com

Measuring just 4" x 4", the P60x "4X4" is the industry's smallest full featured, field upgradable Pentium® M Single Board Computer. Configured as a standalone or mounted onto any VME baseboard, the P60x offers robust I/O features, such as dual Gigabit Ethernet, dual IDE and SATA, and a large CPLD for custom I/O applications. Four independent expansion buses, including PCI-X, PCI, LPC, and I2C, enhance the P60x's exceptional I/O functions. Designed to provide outstanding video functionality, the P60x features an onboard video controller with 64 MB of RAM, DVI-D, and LVDS for direct connection to flat panel and digital displays, and a 4X Advanced Graphic port.



FEATURES:

- Up to 2 GHz Intel® Pentium® M class processor
- Up to 1 GB of 266 MHz DDR SDRAM via SODIMM module
- Dual Gigabit Ethernet ports
- Ultra-low power requirements – as low as 12W
- CPU for next-generation Intel® Pentium® processors

For more information, contact information@gms4sbc.com.

RSC #8301 @www.vmebus-systems.com/catalogrsc

Synergy Microsystems, Inc.

9605 Scranton Road, Suite 700

San Diego, CA 92121

Tel: 888-479-6374 • Fax: 858-452-0060



PVRD Graphics PMC

www.synergymicro.com

Synergy's conduction-cooled PVRD PMC module brings high-performance graphics acceleration and full video capability to your Synergy single board computer. Featuring the P9 graphics device from 3D Labs, the PVRD provides 64 MB DDR SDRAM (frame buffer memory) for high-speed graphics rendering on two independent, high-resolution digital displays. Over 100 32-bit processors on the P9 provide programmable scalar arrays for geometry, texture, and pixel processing.

The PVRD easily supports applications requiring multi-display capability by providing two independent analog RGB or dual DVI outputs. Both interlaced and non-interlaced analog are supported with separate or composite sync on green.



FEATURES:

- Conduction-cooled video/graphics PMC module
- Integrated 64 MB DDR SDRAM (frame buffer memory)
- Dual, independent analog or digital output
- Digital output DVI (PanelLink) compliant
- Supports RS-343 and RS-170 formats on output
- X-Windows and OpenGL support

For more information, contact sales@synergymicro.com.

RSC #8302 @www.vmebus-systems.com/catalogrsc

Octec Limited

Western Road

Bracknell, RG12 1RW

Tel: +44 1344 465200 • Fax: +44 1344 465201



ADEPT60 Video Tracker

www.octec.com

The ADEPT60 is a new and compatible variant in the range of automatic video trackers from Octec Limited. It retains the flexibility of the established ADEPT36, but has a more powerful processing capability. Adding to the multiple inputs and outputs of the earlier trackers, it has a facility for the input of high-speed digital data directly from EO sensors.

The ADEPT60 will run all tracking and detection algorithms, both existing and in development, providing multiple modes of operation. Pre-processors using advanced algorithms are followed by detection and tracking algorithms that include centroid, correlation, edge, "scenelock," "phase correlation," "combination," and "multiple target."

The ADEPT60 will accept video in a 14-bit parallel digital format in addition to analog video in either the CCIR or RS170 standard. The unit offers a range of external interfaces in addition to the VMEbus including RS-422/232 serial links (4) and analog dc. Incorporating a PMC host site that will accept any standard format module enables the ADEPT60 to feature interfaces such as "Hotlink" and IEEE 1394. As with all Octec products, the ADEPT60 is available in both convection and conduction cooled formats and will meet extended temperature ranges for both operation and storage.

Octec is one of the leading independent suppliers of "commercial-off-the-shelf" video tracking and image processing systems to the aerospace market worldwide including most of the major European and US aerospace prime contractors. Octec's engineering expertise encompasses not only the hardware and software design of video trackers and image processing elements but also includes a wide range of complementary technologies. These include system management processing, digital and analog interfacing and signal distribution, and electro-optical sensor specification together with overall systems integration for applications in the airborne, land, and marine environments.



FEATURES:

- High performance, multiple interface, single board video tracker
- Operational with a number of customers in a range of applications
- High clutter rejection using Statistical Target Enhancement Pre-processors
- Complex, multiple algorithm capability for detection and tracking
- Parallel and serial digital video inputs in addition to standard analog
- Features VME, RS-422 serial and analog control/data interfaces
- Symbolology and alpha numeric character generation by three graphics planes
- Convection and conduction cooled formats available
- Operating temperature -40°C to $+70^{\circ}\text{C}$, storage -55°C to $+85^{\circ}\text{C}$
- Menu-driven PC software allows easy setup and development
- Full compatibility with other Octec image processing products

ALPHI Technology Corporation

6202 S. Maple Ave. #120

Tempe, AZ 85283

Tel: 480-838-2428 • Fax: 480-838-4477



VME-4-IndustryPack

www.alphitech.com

ALPHI Technology offers many different industry packs supporting MIL-1553 with UTMCI Summit and DDC miniACE controllers, serial communications, data acquisition, AD/DA, digital I/O, and optically isolated inputs and outputs. FPGAs feature Altera and Xilinx devices with external dual ported memory. All of our data acquisition and ADCs are 16-bit and feature simultaneous sampling with rates up to 1 Msample per second per channel. Also, most models support single-ended and differential inputs with instrumentation amps of 1, 2, 4, and 8 or 1, 10, 100, and 1000. New products include ATC-AD8250D, ATC-fastDAC, ATC-Altera10K50E, and ATC-41meg.



FEATURES:

- 6U VMEbus quad industry pack carrier
- Front-panel and rear I/O
- Supports 8/32-MHz industry packs
- VME A16/A24 slave bus, VME D8/D16
- -20°C to +85°C optional
- Supports 16/32-bit industry packs

For more information, contact eng@alphitech.com.

RSC #8501 @ www.vmebus-systems.com/catalogrsc

ACTIS Computer Inc.

6202 S. Maple Ave.

Tempe, AZ 85283

Tel: 480-838-1799 • Fax: 480-838-4477



VSBC-6872

www.actis-computer.com

VSBC-6872 is a VMEbus based PowerQUICC II Single Board Computer based on the MPC8270 processor. This processor is rated at 855 DMIPS @ 450 MHz and includes a very efficient SDRAM controller. One of the key features of this device is the availability of a Quad Integrated Communications Controller (QUICC). It provides a dedicated module containing a RISC CPU and DMA channels for efficiently handling a wide range of standard or proprietary communications protocols.



FEATURES:

- PowerQUICC II® MPC8270
- 4 x RS-232/422/485/V35
- Three Fast Ethernet ports
- One 32-bit PMC slot CompactFlash
- S-ATA hard disk drive
- VMEbus interface, 32 bits

For more information, contact info@actis-computer.com.

RSC #8502 @ www.vmebus-systems.com/catalogrsc

VXI Technology, Inc.

2031 Main Street

Irvine, CA 92614

Tel: 949-955-1894 • Fax: 949-955-3041

**VT/VX Series**www.vxitech.com

VXI Technology designs and develops a comprehensive line of data acquisition products with a focus on density, modularity, and price/performance.

Our data acquisition measurement and source instruments are designed to address your data acquisition needs ranging from distributed steady-state static measurements to high-speed dynamic applications.

Extensive integrated signal conditioning simplifies the task of configuring a system, and ensures that signal integrity is maintained. Also, signal connections are simplified with a variety of termination options. Select from Scanning and Independent High-Speed Digitizers, Signal Sources, Signal Conditioning, and much more.

**FEATURES:**

- Static and dynamic measurement/control solutions
- Vibration, shock, acoustics, and engine measurements
- Temperature, structural, fatigue, and strain testing
- Extensive, integrated signal conditioning/sourcing
- Scalable, high-density, modular solutions
- VXI plug&play drivers simplify programming tasks

For more information, contact sales@vxitech.com.RSC #8601 @www.vmebus-systems.com/catalogrsc**Technobox, Inc.**

PMB 300, 4201 Church Road

Mount Laurel, NJ 08054

Tel: 609-267-8988 • Fax: 609-261-1011

**4289**www.technobox.com

The enhanced 32-channel, reconfigurable RS-422/RS-485 Digital I/O PMC provides a vehicle for implementing complex digital designs requiring a differential interface. A second-generation FPGA-based design, the 4289 improves on its predecessors with additional features, including 64-bit/66-MHz PCI bus support, 66-MHz local bus clock, and up to 20K LEs. All 32 general-purpose RS-422/RS-485 digital I/Os are wired to both the front panel and rear PN4 connector. The 32-bit data bus is shared between the FPGA and PCI interface devices. SRAM is driven by FPGA outputs, allowing a variety of memory architectures, e.g., single-port SRAM, dual-port SRAM, and one or more FIFOs.

**FEATURES:**

- 32 channels of general-purpose digital I/O
- Enhanced second-generation, FPGA design
- Supports 64-bit/66-MHz PCI bus
- Reprogrammable by host or onboard Flash
- Variable SRAM architectures allowed
- Headers for JTAG connection and Flash programming

For more information, contact info@technobox.com.RSC #8602 @www.vmebus-systems.com/catalogrsc

Vector Electronics & Technology, Inc.

11115 Vanowen St.

N. Hollywood, CA 91605

Tel: 800-423-5659 • Fax: 818-985-7708

**VECTOR VME & VME64X**www.vectorelect.com

VME chassis are available for horizontal or vertically mounted cards in addition to standard 96-pin or 160-pin VME64X. Most chassis are IEEE 1101.10 compliant and are available in custom sizes and configurations from 1U to 12U and with depths up to 400mm.

Our Series 800 portable "Tower" chassis has a removable subrack with an attractive outer enclosure and is available in 5, 7, and 12 slots with multiple backplane and power options. Our "Slimline" chassis is a space-saving 7U and will accommodate up to 21 6U vertical slots.

Vector offers a complete line of standard DIN or EIA RS-310 subracks, front panels, and related accessories. Contact our factory for a rapid quote for your custom requirement.

Our Vectorbord® backplanes are available in VME monolithic (J1/J2) or separate J1 or J2 sizes and are in stock. STDBus and DIN Uncommitted/Universal backplanes provide a low-cost means to construct a custom "bused" backplane with unassigned 96-pin DIN connectors and are available in 2-21 slots.

Vector manufactures all chassis and backplanes in the USA and boasts the shortest lead times. We offer excellent 1-800 factory support. Please contact Vector for your next packaging requirement.

**FEATURES:**

- VME 96-pin or VME64X 160-pin (with J0)
- ABG/EBG auto-switching backplanes
- IEEE 1101.10 compliance
- 250 W to 1,200 W power supply options
- Optional 80mm rear transition
- Ruggedized EMI/RFI versions
- 3.5" and 5.25" drive options
- Choice of standard factory colors
- Custom modification (contact factory)

Hartmann Elektronik GmbH

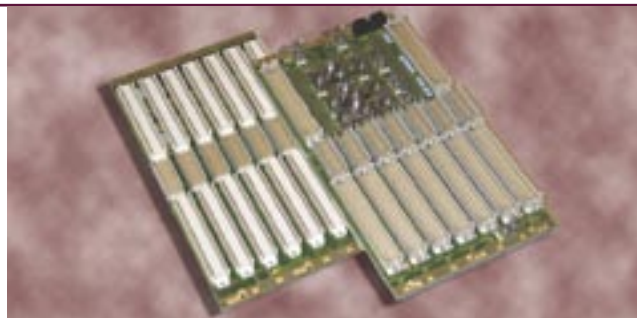
Motorstrasse 43

Stuttgart, D-70499

Tel: +49 711 13989 0 • Fax: +49 711 8661191

**VME64x 5-21 slot 6U**www.hartmann-elektronik.com

The VME64x is an extension of the VME family according to ANSI/VITA 1.1-1997 and permits 64-bit data traffic. In the case of unused slots, the daisy chain signals can be bridged by jumpers or wire-wrap connections from the front or rear of the backplane. Automatic daisy chain wiring with OR gates makes manual setting of jumpers unnecessary. ALL Hartmann VMEbus boards are based on the HIGH-SPEED DESIGN concept. Shielding of each individual signal line assures minimal coupling and, therefore, guarantees trouble-free operation. Low reflection is achieved by means of uniform signal line surge impedance. Customized backplanes are one of our specialties and can be implemented short-term.

**FEATURES:**

- +5V/+3.3V/GND is supplied via terminal bars
- Outer layers designed as shielding areas (best HF)
- Maximum loading of terminal bar = 200A; screw = 25A
- Termination: active 0°C to 70°C; passive -40°C to 85°C
- HF coupling of card rack and system ground
- Impedance checked transfer characteristics

For more information, contact info@hartmann-elektronik.de.RSC #8801 @www.vmebus-systems.com/catalogrsc**2E SysCom, Inc.**

86 Kendall Ave.

Framingham, MA 01702

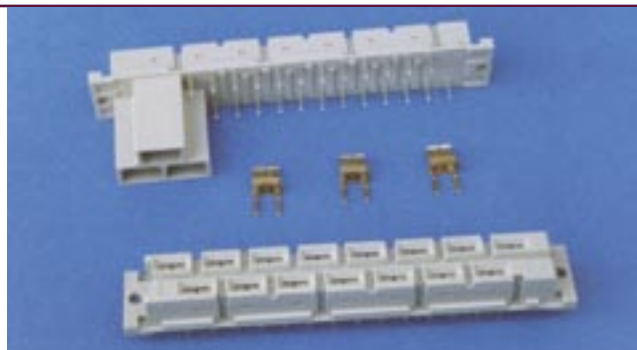
Tel: 508-620-1678 • Fax: 508-935-2286

**H15 Pressfit DIN**www.2esyscom.com

2E introduces the H15 female connector in pressfit variation. H15 DIN 41612 connectors have 15 contacts rated at 15A each. The standard version has 30 pressfit pins (two per contact) suitable for PCB thicknesses greater than 1.6mm. A special variation suitable for main power supplies (also depicted) has faston pins in position 28, 30, and 32. Leakage distance between the faston pins is greater than 8mm. Pressfit thru-hole size is 0.40 +/- .003. Both connectors are provided with integrated coding.

Also available from 2E are H15HA mixed pin power connectors with two or four pins rated for 50A/pin and the remainder (10, 9, or 7) as standard 15A pins.

For more power connectors, go to 2esyscom.com.

**FEATURES:**

- Pressfit H15 female DIN
- Maximum operating current 15A/pin
- Rated voltage 500V
- Test voltage 3100V
- Temperature range -65°C to +125°C
- Connector body material (PBT) UL 94-V0

For more information, contact 2e@2esyscom.com.RSC #8802 @www.vmebus-systems.com/catalogrsc

Oregon Micro Systems, Inc.

1800 NW 169th Place, Bldg. C100

Beaverton, OR 97006

Tel: 800-707-8111 • Fax: 503-629-0688

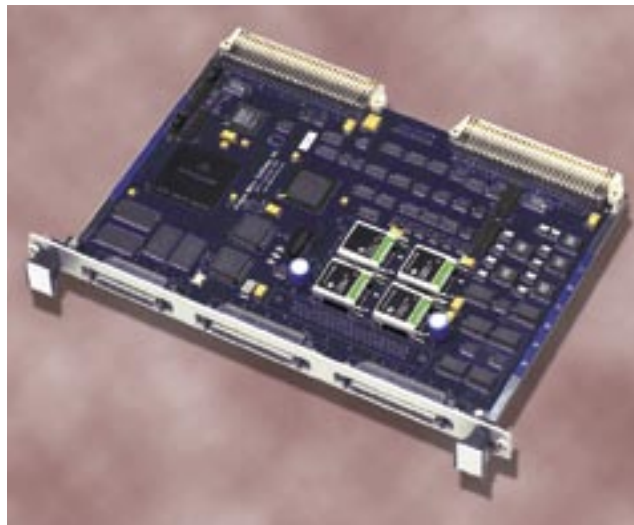


MAXv

www.omsmotion.com

The new MAXv one to eight axes motion controller is VME64 compliant and backwards compatible with the VME58 controller. MAXv is built on a PowerPC 32-bit RISC processor running at 266 MHz. The use of this processor delivers exceptional servo control, capabilities, quality, and application performance on multi-axis requirements. User-selectable axes types include open or closed stepper and 16-bit analog servo. Independent analog inputs bring parameters such as temperature and pressure under the control of the running application. Two additional encoder inputs boost precision and control. All signals, data points, and the PID loop update every 122 μ s on all axes. Independent positive and negative limits, a home switch input, and an auxiliary output monitor axes states. Additional 16 user-definable I/O synchronize and control other events at the same 122 μ s update rate. Electronic gearing can either track another motor or manual input device such as an independent encoder.

The bus interface uses shared memory technology to communicate both commands from the host and feedback of motion control parameters, eliminating the communication bottlenecks of single-address, port-based approaches. MAXv controllers use the PowerPC's message unit including doorbell technology to alert and flag the host or controller. Interrupt control and other data are available through reserved storage regions in the common memory area. Simple two or three character ASCII commands go to the board from high-level languages, such as C, C++, and Visual Basic, while complex move sequences, time delays, and control of other external events program through the MAXv interface. Commands form character strings to create sophisticated motion profiles including I/O and other functions. MAXv controllers support two 68-pin and one 50-pin SCSI type connector on the front panel as well as a 160-pin connector at P2 for backplane connections.



FEATURES:

- PID update rate of 122 μ s on all eight axes
- VME64 bus specification ISO/IEC 15776:2001(E)
- Backwards compatible with VME58 board
- 266 MHz, 32-bit RISC processor
- One 50-pin SCSI and two 68-pin SCSI connectors on the front panel
- Two analog outputs, two encoder inputs, six analog inputs, and 16 digital I/O
- The 160-pin P1/P2 connectors provide high density connectivity on the backplane
- Configurable PID filter with feed forward coefficients

SBS Technologies®

2400 Louisiana

Albuquerque, NM 87110

Tel: 505-875-0600 • Fax: 505-875-0400



VG5 — 6U VMEbus CPU

www.sbs.com

A dual/single processor single board computer designed to meet the needs of high-performance embedded applications. It addresses markets like industrial automation, medical, scientific, and aerospace where real time and/or signal processing is needed. Operating support includes VxWorks, Linux, and LynxOS.

The ultra compact, 6U single slot contains an impressive array of onboard peripherals and includes up to two Gigabit and two 10/100Mbit Ethernet ports, up to four high speed multiprotocol serial controllers (HDLC, BiSync), one serial-ATA port, two PMC extension slots, UARTS, timer/counter, and general purpose I/Os. For more information and to obtain a complete product listing of SBS' I/O and communication products, visit our website at <http://www.sbs.com/products/singleboard>.



FEATURES:

- PowerPC processors with AltiVec™ technology
- Asymmetric Multiprocessing Architecture (ASMP)
- Integrated Gigabit Ethernet and Fast Ethernet ports
- Two PMC slots
- Commercial and conduction-cooled versions available
- FPGA allows user to program specific I/O functions

For more information, contact info@sbs.com.

RSC #9001 @www.vmebus-systems.com/catalogrsc

MEN Micro

3740 N. Josey Lane, Suite 203

Carrollton, TX 75007

Tel: 972-939-2675 • Fax: 972-939-0055



A13 6U VME64 Intel

www.menmicro.com

The A13 is a complete VME64 SBC, ideal for Windows or Linux applications that need video output. With an Intel Tualatin processor, the A13 is a powerful, yet low-power 6U VMEbus SBC requiring only one slot. Processor options include: Celeron (400 MHz/100 MHz FSB/256K L2 cache) or Pentium III (933 MHz/133 MHz FSB/512K L2 cache). The A13 utilizes the 815G chipset, which includes an embedded graphics controller. Other capabilities include USB and Gigabit or Fast Ethernet. The A13 can be delivered with PMC or PC-MIP mezzanine slots. With the combination of modular I/O and high-performance CPU, very customized systems can be configured based on standard components.



FEATURES:

- Celeron or Pentium III (400 MHz or 933 MHz)
- Integrated VGA graphics controller
- 256 MB or 512 MB SDRAM
- Gigabit or Fast Ethernet
- PMC or PC-MIP mezzanine slots
- Industrial temperature range on request

For more information, contact egodsey@menmicro.com.

RSC #9002 @www.vmebus-systems.com/catalogrsc

MEN Micro

3740 N. Josey Lane, Suite 203
 Carrollton, TX 75007
 Tel: 972-939-2675 • Fax: 972-939-0055

**A15 6U PowerPC SBC**
www.menmicro.com

The A15 is a PowerPC SBC for embedded VMEbus applications. With a full A64/D64 VMEbus interface that utilizes 1 MB of dual-ported SRAM, the A15 can function as a VMEbus master or slave. The 400-MHz MPC8245 PowerPC has a 32-bit/33-MHz PCI local data bus. The A15 includes onboard DRAM, Flash, and CompactFlash memory; dual Fast Ethernet; four COMs; USB; IDE and keyboard/mouse interfaces; and an optional onboard hard disk. An onboard FPGA is available for user-defined functions. The A15 can be delivered with PMC, M-Module, or PC-MIP mezzanine slots. With the combination of modular I/O and high-performance CPU, customized systems can be configured based entirely on standard components.

**FEATURES:**

- Motorola PowerPC
- Integrated Level 1 cache (internal to MPC8245)
- SO-DIMM socket for up to 512 MB SDRAM
- Two 10/100Mbit Ethernet ports
- PMC, M-Module, or PC-MIP mezzanine slots
- Temperature range: 0°C to +60°C or -40°C to +85°C

For more information, contact egodsey@menmicro.com.

RSC #9101 @ www.vmebus-systems.com/catalogrsc

Solflower Computer, Inc.

3511 Thomas Road, # 2
 Santa Clara, CA 95054
 Tel: 408-982-8680 • Fax: 408-982-8685

**SolSTAR-VME**
www.solflower.com

The SolSTAR-VME series from Solflower Computer, Inc. allows existing VME 6U and/or PCI boards to connect to any PCI-based Sun computer via StarFabric switching technology.

The SolSTAR-VME device drivers have been developed by Solflower to run on Sun's UltraSPARC or on an Intel x86-based machine.

The above package provides Fabric discovery, Multicast operation, PCI configuration, and User Map operations. These operations allow users to take advantage of switching technology for applications running the Solaris operating system.

**FEATURES:**

- Transparent PCI-to-PCI expansion
- Expandable up to a few hundred expansion nodes
- Fabric Library supports multicast, path routing
- Graphical user interface for device management
- Fabric technologies available for Sun's Solaris
- VME runs on new Sun machine with no driver change

For more information, contact sales@solflower.com.

RSC #9102 @ www.vmebus-systems.com/catalogrsc

AcQ Inducom

Raadhuislaan 27A

oss, 5341 GL

Tel: +31 412 641922 • Fax: +31 412 622640

> InduCom > Acquisition

>>> people inventing technology
creating systems serving people >>>**VMEbus Products**www.acq.nl

AcQ Inducom is leading in design, development, and supply of embedded computer hardware and software. For some applications, a standard product is not sufficient. In that case, we supply a customer-specific solution. We have the expertise to set up the entire development project from A to Z, from the start of the requirement specification via the design and development to the implementation and support. We are also capable of supplying a complete integrated system. We offer a wide range of standard products, which include CompactPCI, PCI, and VMEbus I/O products, all based on the M-module industrial mezzanine ANSI standard. Product overviews are available on our website at www.acq.nl.

Our VMEbus board I/O products are based on the following VMEbus carriers:

i4000 Quad M-module carrier for VMEbus (6U)

This carrier features four M-module slots; occupies only one VMEbus slot offering selectable short or standard VMEbus addressing (A16/A24) with byte (even/odd) or word data transfers (D08(E/O)/D16); includes a programmable interrupt controller with D08(O) interrupter characteristics, and a separate interrupt vector available for each (M-module) slot; and features peripheral I/O connections up-front with optional via P2 connector.

i4001 Single M-module carrier for VMEbus (3U)

This carrier features one M-module slot; occupies one 3U VMEbus slot offering selectable short or standard VMEbus addressing (A16/A24) with byte (even/odd) or word data transfers (D08(E/O)/D16); includes a programmable interrupt controller with a D08(O) interrupt vector and I(x) interrupt level characteristics; and includes peripheral I/O connectors up-front.

To support the modular hardware, we have developed a modular software concept, called APIS (AcQ's Platform Interface Software). Based on APIS, a wide range of operating systems is supported, such as Windows XP/NT/98, DOS, VxWorks, QNX, Linux, SunOS, and OS-9. Thanks to APIS, new emerging operating systems can swiftly be supported.

**FEATURES:**

- Analog and digital I/O
- CANbus
- ARINC 429
- Serial interfaces and serial communication
- Stepper and DC motor controllers
- LVDT/RVDT
- Motion control
- CompactFlash interface
- Ethernet
- High-speed, DSP-based analog I/O
- ISDN
- SCSI

Dy 4 Systems

333 Palladium Drive

Kanata, ON K2V 1A6 Canada

Tel: 613-599-9191 • Fax: 613-599-7777



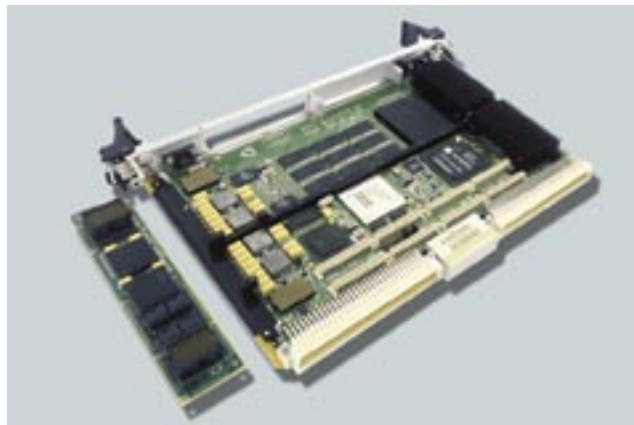
SVME/DMV-182

www.dy4.com

Using dual 1.2-GHz Motorola MPC7457 PowerPC processors with AltiVec technology and 1 Gbyte of state-of-the-art DDR SDRAM, the 182 represents the new functionality and performance benchmark for rugged single board computers. With two 64-bit PMC sites, one that supports 133-MHz PCI-X and an unparalleled complement of I/O capability such as Gigabit Ethernet, 10/100 Ethernet, six serial ports, and two USB ports, the 182 will satisfy the most demanding requirements of embedded computing applications.

The 182 is available with a dual channel MIL-STD-1553B interface option that does not require the use of a PMC site. For implementing system networks with Gigabit Ethernet technology, the 182 is supported by Dy 4's SVME/DMV-680 24-port Gigabit Ethernet Switch.

Available in the full Dy 4 range of environmental build grades, the 182 is targeted to the sophisticated data processing needs of tactical aircraft, armored vehicles, and many harsh environment naval systems.



FEATURES:

- Single or dual 1.2-GHz 7457 PowerPC processors
- Each processor has 64 Kbytes L1 cache and 256 Kbytes internal L2 cache
- 2 Mbytes external L3 cache per processor
- 512 Mbytes or 1 Gbyte of DDR SDRAM with ECC
- 128 Mbytes of contiguous direct-mapped Flash memory
- Hardware Flash write protection jumper
- Protected Access Boot System
- 32 Kbytes AutoStore nvSRAM
- One 10/100/1000Base-T Gigabit Ethernet port and one 10/100 Base-T Ethernet port
- Gigabit Ethernet networking supported with Dy 4 SVME/DMV-680 24-port GbE Switch
- Two 64-bit 66 MHz PMC sites on independent PCI buses
- One 133-MHz PCI-X capable PMC and one 66-MHz capable
- Controlled impedance I/O routing for Fibre Channel, digital video, and other high-speed interfaces

Interface Concept

Z.I. N°2 des Pays-Bas

F-29510 Briec De L'Odet, France

Tel: + 33 (0)2 98 573 030 • Fax: + 33 (0)2 98 573 000



IC-PQ2-PMCb

www.interfaceconcept.com

Based on a PowerQUICCII, the Interface Concept's IC-PQ2-PMCb is a rugged PPMC designed for embedded applications in conduction-cooled environments. Providing three Fast Ethernet ports and four multipurpose serial controllers, the board offers a wide SDRAM with ECC, Flash, and SRAM memory resources.

Used in conjunction with VME, CompactPCI carriers, or proprietary boards, this PPMC is suited for low-consumption processor modules, multi-Ethernet links communication controllers, and Ethernet channels with redundancy.

Software support includes firmware (boot, built-in test, debug services), and BSP for VxWorks and Linux. In-house protocol support includes HDLC, BiSync, framed asynchronous drivers and LLC, and TCP/IP network stack.



FEATURES:

- Conduction-cooled PPMC boards
- PowerQUICCII™ MPC8270 running at 266 MHz
- Three 10/100Base-Tx Fast Ethernet ports
- 64-128 MB SDRAM-ECC/8-32 MB Flash/128 KB SRAM
- Mass Flash option up to 256 MB
- Thermal monitoring

For more information, contact info@interfaceconcept.com.

RSC #9401 @www.vmebus-systems.com/catalogrsc

Carlo Gavazzi Mupac, Inc.

10 Mupac Dr.

Brockton, MA 02301

Tel: 800-926-8722 • Fax: 508-588-0498



509 Series Enclosure

www.cgmupac.com

CG Mupac's 509 Series is a VME64, VME64x, and MBII vertical board loading enclosure offering up to 21 slots (4HP). Pressurized or evacuation cooled, this enclosure comes in either rackmount or desktop configurations and features recess or flush mount boards, fixed mount drive options, I/O provisions, and power supplies to 1000W. The 509 Series Enclosure is 20.5" (520,7) deep and 8U to 12U high.



FEATURES:

- VME64, VME64x, and MBII vertical load
- Pressurized or evacuation cooled
- Up to 21 slots (4 HP)
- Power supplies to 1000W
- Rackmount or desktop
- Recess or flush mount boards

For more information, contact gavazzi@mupac.com.

RSC #9402 @www.vmebus-systems.com/catalogrsc

Ballard Technology, Inc.

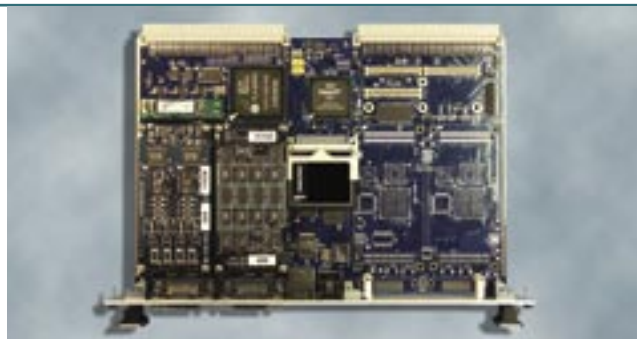
3229A Pine Street

Everett, WA 98201

Tel: 800-829-1553 • Fax: 425-339-0915

Ballard Technology**OmniBus VME**www.ballardtech.com

Ballard's OmniBus VME avionics databus interfaces set a new standard for flexibility and power. OmniBus is available with multiple dual-redundant MIL-STD-1553 databuses (up to eight) or with a mix of protocols (1553, ARINC 429/708/717, serial, Ethernet, etc.) and is suitable for a broad range of applications. Extensive capability is provided for easy-to-use simulation, monitoring, and testing. An onboard PowerPC® processor can be programmed by the user to off-load or run independently of the VME system processor. The OmniBus VME may be run locally through the VME backplane, remotely via Ethernet, or standalone from user code embedded on the PowerPC. The PrPMC-compatible site provides additional flexibility. OmniBus is also available for PCI, CompactPCI, and Ethernet/USB.

**FEATURES:**

- Up to eight dual-redundant MIL-STD-1553 buses
- Single and multi-terminal models
- BC, 32 RT's, bus monitor, error injection
- IRIG time-tags/synchronization
- Ethernet (10/100) and serial (RS-232)
- PowerPC user processor/CompactFlash socket

For more information, contact sales@ballardtech.com.RSC #9501 @www.vmebus-systems.com/catalogrsc**SBS Technologies®**

2400 Louisiana

Albuquerque, NM 87110

Tel: 505-875-0600 • Fax: 505-875-0400

**VR9 Rugged CPU**www.sbs.com

A 6U VMEbus, all-in-one CPU board with an integrated low-power gigahertz processor speed and dual Gigabit Ethernet channels compliant to VITA 31.1-2003. The VR9 is designed to meet the needs of embedded application developers addressing markets like industrial automation, medical, scientific, imaging, telecommunication, military, and aerospace.

Based on the Intel® Pentium® M processor (0.13 chip technology), the VR9 platform is designed to support processors starting with 600 MHz up to 1.6 GHz. It offers low power consumption and eliminates the need for onboard ventilation.

Supported operating systems are Windows® 2000, Windows® XP, QNX, VxWorks®, LynxOS®, Linux®, and others. For more information and to obtain a complete product listing of SBS' I/O and communication products, visit our website at <http://www.sbs.com/products/singleboard>.

**FEATURES:**

- Intel® Pentium® M processor, 600 MHz to 1.6 GHz
- Two Gigabit Ethernet ports 10/100/1000Base-T
- VITA 31.1 compliant
- NVIDIA® GeForce-4 Go and 3D graphics accelerator
- For rugged applications requiring a powerful CPU
- Highly configurable robust solution

For more information, contact info@sbs.com.RSC #9502 @www.vmebus-systems.com/catalogrsc

Thales Computers

3100 Spring Forest Road

Raleigh, NC 27616

Tel: 1-800-848-2330 • Fax: 919-231-8001



PowerNode3

www.thalescomputers.com

The PowerNode3 is a single/dual 1-GHz PowerPC G4 high-end computing node featuring enhanced connectivity and reduced power consumption. PowerNode3 is designed for state-of-the-art applications requiring real-time data and signal processing, including sonar, radar, medical imaging, and machine vision systems.

The new PowerNode3 features dual and single Motorola PowerPC G4 7457 processors running at 1 GHz, each equipped with a 2-MB L3 cache and 2-MB private SRAM, linked via a 133-MHz Avignon host bridge. Up to 1 GB of onboard SDRAM is accessible at the local bus speed of 133 MHz. The new board provides two PCI Mezzanine Card (PMC) slots (one 64-bit 66 MHz and one 32-bit 33/43 MHz).

PowerNode3 is designed for connectivity, with an ALMA2e VME-PCI bridge that enables 2eSST data transfers at up to 180 MBps for VME board interconnection. Dual Gigabit Ethernet interfaces and four asynchronous EIA-232/422/485 lines provide a range of high-speed networking and connection options. In addition, three differential 4x high-speed links are routed to the P0 backplane (as per PICMG 2.17), enabling the PowerNode3 CPU board to be interconnected to fabric technologies based on the LVDS standard.

The PowerNode3 sets a new standard for low power consumption in a high-end node, with a typical draw of just 30W for dual CPU configuration, versus competitive boards that draw up to 60W (with 7455 1-GHz solutions). The new board is available in three convection-cooled versions (standard, extended temperature, and rugged), as well as a rugged conduction-cooled version for harsh environment applications.



FEATURES:

- First dual 1-GHz PPC CPU board at 30W
- Single/dual PowerPC G4 high-performance computing node
- Enhanced connectivity, reduced power consumption
- Draws only 30W (in dual CPV configurator) vs. 60W for competitive brands
- 2eSST capability, up to 180 MBps peak or 150 MBps sustained throughput
- Motorola PowerPC G4 7457 processors running at 1 GHz
- Equipped with a 2 MB L3 cache and 2 MB private SRAM
- Linked via a 133-MHz Avignon host bridge
- Up to 1 GB onboard SDRAM accessible at local bus speed of 133 MHz
- Two PCI Mezzanine Card (PMC) slots
- Three convection-cooled versions and a rugged conduction-cooled version

SBS Technologies®

2400 Louisiana

Albuquerque, NM 87110

Tel: 505-875-0600 • Fax: 505-875-0400

**VME 6000 Mission Computer**www.sbs.com

The VME-6000 is a rugged, yet highly flexible VME computing platform suitable for applications that demand rock-solid reliability such as avionics, navtronics, and vetronics mission computing.

In order to ensure that your mission computer will withstand harsh environmental conditions, SBS engineers utilize Finite Element Analyses (FEA) to perform multiple shock, vibration and thermal tests before the system is even manufactured.

During the initial software development and hardware integration process, SBS provides a custom Engineering Development Unit (EDU). Each EDU has custom I/O panels with the same connector interface as the final rugged unit.

Our flexible, rugged computing platforms are easy to configure for general-purpose processing, I/O, video, and graphics processing in a variety of mission critical applications. All COTS products from SBS conform to open standards, which makes future technology insertion far easier to manage.

An example configuration of the VME-6000 mission computer contains two powerful conduction cooled VR7 single board computers, a high-speed serial interface, a VME Flash SCSI card and a programmable ABI MIL-STD-1553 interface. However, each unit can be customized to specific needs.

For more information, or for a complete listing of SBS mission computers, visit our website at <http://www.sbs.com/products/systems>.

**FEATURES:**

- Two VR7 VMEbus conduction-cooled single board computers
- High-speed serial interface
- VME Flash SCSI card
- VME plug-in power supply
- Custom designed I/O available
- Five slots available
- 16-40 VDC 150W power supply
- 6U VMEbus form factor

Synergy Microsystems, Inc.

9605 Scranton Road, Suite 700

San Diego, CA 92121

Tel: 888-479-6374 • Fax: 858-452-0060



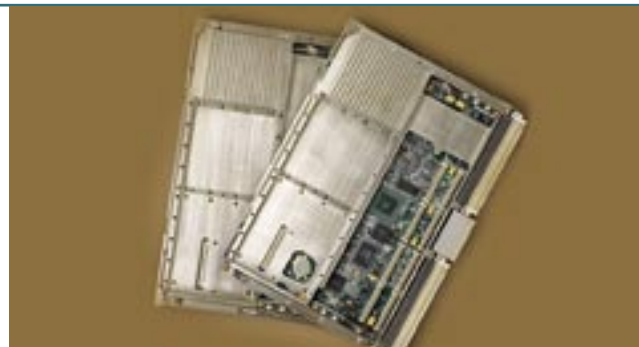
Rhino SBCs

www.synergymicro.com

Synergy's Rhino family of conduction-cooled, ruggedized, single board computers continues to break performance barriers by combining the latest PowerPC G4 CPUs with the richest feature set available on a COTS SBC.

The Rhino hosts either one or two PowerPC 7457's at speeds up to 1.3 GHz, coupled with the 133-MHz Discovery system/memory controller. Up to 1 GB SDRAM, 1 GB Flash memory, two PMC sites, and a host of onboard I/O including multiple serial, Ethernet, and FireWire ports provide maximum flexibility.

To meet specific system requirements, the Rhino is available with either two dual-redundant MIL-STD-1553 channels (Rhino MX) or dual StarFabric switch fabric interfaces (Rhino DX).



FEATURES:

- Conduction-cooled and ruggedized SBCs
- Single or dual PowerPC 7457 CPUs, up to 1.3 GHz
- MIL-STD-1553 (MX) or StarFabric interconnect (DX)
- Onboard serial, Ethernet, and FireWire
- Up to 1 GB SDRAM and 1 GB Flash memory
- Software support for VxWorks, INTEGRITY, and Linux

For more information, contact sales@synergymicro.com.

RSC #9801 @www.vmebus-systems.com/catalogrsc

Elma Electronic

44350 Grimmer Blvd

Fremont, CA 94538

Tel: 510-656-3400 • Fax: 510-656-3783



Elma Rugged COTS

www.elma.com

Elma's COTS 12R2 is a high-quality and cost-efficient rugged package for all VME/VME64x and CompactPCI applications. The rugged product line includes 5U-14U models for both 6U and 9U cards. Shock-isolation is optional. Intended to withstand the demands of a military environment, the 12R2 is designed to meet benchmark military standards.



FEATURES:

- VME/VME64X and CompactPCI backplanes, 2-20 slots
- Standard sizes: 5U, 8U, 9U, 10, 12U, and 14U
- Complete EMI/RFI integrity
- 350 -1400 watt power supplies
- Tested for shock, vibe, and structural integrity
- Designed to meet MIL-STD: 461, 810, 704, and 167

For more information, contact sales@elma.com.

RSC #9802 @www.vmebus-systems.com/catalogrsc

Tracewell Systems

567 Enterprise Drive
Westerville, OH 43081

Tel: 800-848-4525 • Fax: 614-846-4450



Tracewell R-HPC VXI

www.tracewellsystems.com

The R-HPC is the latest in high-power, low-weight, rugged VXI chassis from Tracewell.

R-HPC uses advanced welded laminate construction, capable of random vibration levels of 50 Gs, yet at just 50 lbs., is easy to transport.

The 2200W distributed plugging power system provides exceptional transient response, regulation, and fault tolerance. To manage this power, the backplane uses unique power routing and high current connectors.

The high-pressure fan module provides 450 CFM at 0.4" of H2O, making R-HPC ideal for high-density analog and digital VXI modules. An RS-485 monitor tracks fan speed, DC voltages, and temperature, reporting status, levels, and fault conditions to the host.



FEATURES:

- Welded laminate construction for high strength
- 2.2KW distributed power system
- High-pressure plugging fan module; 450 CFM at 0.4"
- RS-485 compatible intelligent monitoring
- HALT tested to 50 Gs vibration and -30°C to +55°C
- Options for VME, PXI, CompactPCI, and other platforms

For more information, contact sales@tracewell.com.

RSC #9901 @www.vmebus-systems.com/catalogrsc

Hybricon Corporation

12 Willow Road
Ayer, MA 01432

Tel: 877-HYBRICON • Fax: 978-772-2963



RME821M Enclosures

www.hybricon.com

Hybricon Corporation's new 8U rackmount enclosures feature high quality ruggedized construction and a compact stackable design for vertically mounted cards. The high performance cooling option supports demanding high power applications and delivers 310 LFM per slot, sufficient cooling for up to 60 watts per slot.

The enclosures are designed to meet MIL-STD-461 EMI radiated and conducted emissions and susceptibility standards by using gasketing at all seams and 1" thick honeycomb panels at both air intake and exhaust. The chassis supports the addition of an RP2 overlay board or 80mm rear transition area. Also included are provisions for shielded connectors for I/O. The enclosures are available with 21-slot VME64x, VME, VXS, or CompactPCI backplanes and up to 1200 watts of embedded power.



FEATURES:

- High quality ruggedized construction
- Cooling up to 60 watts per slot
- Front-panel LCD display and monitoring subsystem
- Fully compatible with IEEE 1101.10/11
- Mounting for two internal hard drives
- Custom configurations available

For more information, contact info@hybricon.com.

RSC #9902 @www.vmebus-systems.com/catalogrsc

Adtron Corporation

4415 E. Cotton Center Blvd., Suite 100

Phoenix, AZ 85040

Tel: 602-735-0300 • Fax: 602-735-0359



SV6 – SCSI 6U VME Storage Blade

www.adtron.com

The SV6 plugs into a 6U VME slot and allows up to three IDE drives to be assigned as individual logical units (LUNs) or grouped into one combined capacity LUN using RAID 0 interleaving. The SCSI connection may be made through VME P2 or the front panel connector.

Adtron SCSI storage systems deliver performance and proven reliability for data and mission critical systems. Added benefits of flexibility are built into Adtron SCSI storage systems, including easy field firmware upgrades, increased storage capacity as IDE hard disk and Flash disk capacities increase, and support for OEM application specific features.

To see the complete line of Adtron SCSI, IDE, and Ethernet storage blades, visit our website at <http://www.adtron.com> or contact us at 602-735-0300.



FEATURES:

- Up to 240 Gbytes of disk storage in a single 6U VME slot, or
- Up to 12 Gbytes of solid state Flash in a single slot configuration, or
- Up to 24 Gbytes of solid state Flash in a double slot configuration
- Flash models operate over extended temperature ranges
- I/O compatibility with either Force or Motorola P2 SCSI configurations
- Front-panel, 50-pin high density J1 SCSI connector for front chassis cabling
- No additional software drivers required for operation
- Operates as a boot and data storage system
- Tape or disk emulation of industry standard magnetic storage systems

Synergy Microsystems, Inc.

9605 Scranton Road, Suite 700

San Diego, CA 92121

Tel: 888-479-6374 • Fax: 858-452-0060



Manta QX (VAFS)

www.synergymicro.com

Manta QX packs 50 GFLOPS of pure processing muscle into a single-slot, air-cooled SBC. Its SMP architecture is perfect for CPU-intensive, DSP applications. Load balancing among four 1-GHz PowerPC 7457 CPUs enables an application to tap the Manta's efficient task-scaling capabilities for shared memory processes.

2 GB of high-speed SDRAM, 1 GB Flash memory, one PMC site, and abundant onboard I/O options, including multiple serial, Ethernet and FireWire ports, provide ultimate system flexibility. The onboard PCI-StarFabric bridge provides two, 2.5-Gbps, board-to-board switch fabric serial links for high-performance clustered computing.

OS support includes VxWorks, INTEGRITY, and Linux.



FEATURES:

- Quad PowerPC 7457 CPUs at 1 GHz
- Dual StarFabric interfaces, 2.5 Gbps full-duplex
- Onboard serial (4), Ethernet (2) and FireWire (2)
- Up to 2 GB SDRAM and 1 GB Flash memory
- Symmetric multiprocessing (SMP) architecture
- Software support for VxWorks, INTEGRITY, and Linux

For more information, contact sales@synergymicro.com.

RSC #10101 @ www.vmebus-systems.com/catalogrsc

Transtech DSP

Suite 275, 171 E. State St., Box 120

Ithaca, NY 14850

Tel: 607-272-5494 • Fax: 607-272-5498



PMC-FPGA03

www.transtech-dsp.com

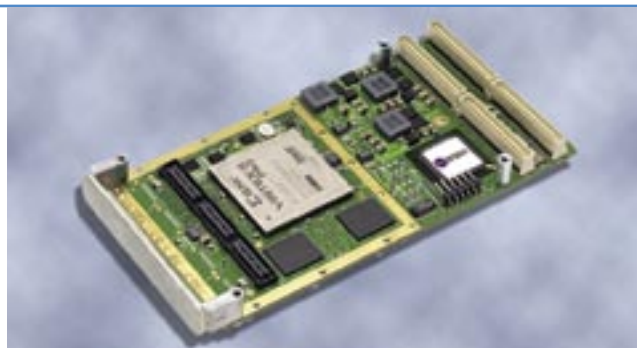
The Transtech PMC-FPGA03 is a Xilinx Virtex-II Pro™ FPGA-based 64-bit/66-MHz PMC. The onboard XC2VP50 FPGA provides ample gates for users to install their own signal processing cores, while providing GigaHertz rate I/O.

The onboard XC2VP50 FPGA ties directly to three banks of QDR SRAM and two SDRAM banks.

138 signals are routed from the FPGA to the front panel and 64 are routed to the user I/O connector. Each of these banks can be independently configured. Four RocketIO channels are available through the front panel and four via P4.

Windows, VxWorks, or Linux host support available.

Standard and rugged build options are also available.



FEATURES:

- Xilinx Virtex-II Pro™ FPGA XC2VP50-5 or -6 grade
- RocketIOs routed to front panel or P4 connector
- 138 front-panel signal lines and 64 PMC user I/Os
- 64-bit/66-MHz master/slave PCI interface
- Two 64 MB banks of DDR SDRAM, three banks QDR SRAM
- Rugged, conduction-cooled build options

For more information, contact sales@transtech-dsp.com.

RSC #10102 @ www.vmebus-systems.com/catalogrsc

Mercury Computer Systems

199 Riverneck Road

Chelmsford, MA 01824-2820

Tel: 800-229-2006 • Fax: 978-256-3599



RACE++ FPGA Compute Nodes

The RACE++® Series MCJ6 FCN boards from Mercury Computer Systems provide a flexible, manageable way to exploit the power of Field Programmable Gate Arrays (FPGAs) in RACE++ multi-computer systems. By making FPGAs operate as a seamless element of the RACE++ environment, developers can partition their applications between performance-leveraging segments that run best on the FPGA and portions that can execute on easier-to-program PowerPC microprocessors.

The MCJ6 FCN module is a 6U VME board with two Virtex-II Pro™ P70 FPGAs. Each FPGA leverages its own memory, I/O, and RACE++ fabric connections. The two FPGA compute nodes on each board can work together on the same data set, communicating together more than ten 2.5 Gbps serial links.

The 8 MB of QDR II SRAM in each FCN provides low-latency memory with peak access rates of 6.4 GB/s. Larger data sets can be staged in the 128 MB RLDRAM II of each FCN. High-bandwidth data transfers are realized through the Mercury-provided memory controller IP.

Mercury's MCJ6 FCN modules provide six full-duplex fiber-optic and four copper serial connections for each FCN, as well as LVDS lines for parallel I/O, giving each board more than 6 Gbps of direct I/O capacity. Delivering I/O directly to the FPGAs allows these devices to perform repetitive operations that reduce data volume before passing it on to the balance of the system. This feature permits handling of more I/O without increasing the system processor count.

Through the FPGA Development Kit (FDK), Mercury delivers the MCJ6 FCN module with intellectual property for the RACE++ fabric interface, memory transfers, and I/O management. Users need only incorporate their application-related algorithmic firmware to create complete bit streams. Mercury can help customers create FPGA-based solutions or develop the FPGA-resident portion of an application for a complete turnkey solution.



FEATURES:

- FPGA compute nodes fully integrated into a RACE++ VME system
- Easy application partitioning between FPGAs and PowerPCs
- Off-the-shelf IP Provides RACE++ and memory interfaces
- FPGA Developer's Kit (FDK) simplifies FPGA code development
- Ample I/O: 10 full duplex connections @ 2.5 Gbps (6 fiber, 4 copper serial)

Technobox, Inc.

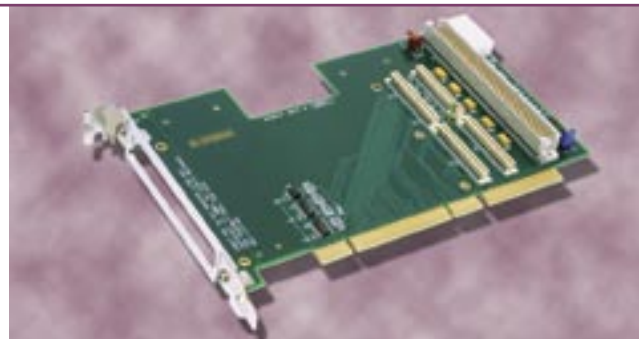
PMB 300, 4201 Church Road

Mount Laurel, NJ 08054

Tel: 609-267-8988 • Fax: 609-261-1011

**4366**www.technobox.com

The 4366 is a passive PMC-to-PCI adapter that allows use of a 32 or 64-bit/33-MHz PMC in a PCI slot. Diagonal routing, impedance controlled signal layers, and four power planes optimize signal quality. To assure a solid mechanical connection for the PMC bezel, the adapter features a machined aluminum front panel. The 64 rear I/O signals from the PMC are directed to a 96-pin DIN connector situated on the rear of the adapter. Several LEDs show the status of power and key PCI bus signals (e.g., INTx, BUSMODE, and REQ32). External power (+12 and +5 volts) can be supplied to the adapter via its standard four-pin power connector. An optional fan assembly (P/N 3675) can be installed to augment cooling.

**FEATURES:**

- Adapts 32 or 64-bit PMC (33-MHz) to PCI slot
- Designed for optimal signal quality
- Support for rear I/O
- LEDs show status of key PCI bus signals and power
- Accommodates external power
- Optional fan assembly for additional cooling

For more information, contact info@technobox.com.RSC #10301 @www.vmebus-systems.com/catalogrsc**Technobox, Inc.**

PMB 300, 4201 Church Road

Mount Laurel, NJ 08054

Tel: 609-267-8988 • Fax: 609-261-1011

**4352**www.technobox.com

The 4352 is a PMC-X to PCI-X adapter that allows delivery of PMC-derived applications in a standard PCI or PCI-X environment. An Intel 31154 bridge supports PCI (33 or 66 MHz) and PCI-X (66/100/133 MHz) on both the primary and secondary buses. 32-bit and 64-bit transactions are supported. Furthermore, the bridge will translate transfer width, clock frequency, and protocol differences. LEDs provide status of power and key bus signals. To assure solid connection with PMC bezel, the adapter features a machined aluminum panel. Rear I/O signals are directed to a 96-pin DIN connector situated on the rear of the adapter. External power can be applied. An optional cooling fan is available.

**FEATURES:**

- Adapts PMC or PMC-X modules to PCI or PCI-X
- Employs Intel 31154 bridge
- Supports PCI (33/66) and PCI-X (66/100/133)
- Rear I/O support
- LEDs show status of key PCI bus signals and power
- Accommodates external power

For more information, contact info@technobox.com.RSC #10302 @www.vmebus-systems.com/catalogrsc

Technobox, Inc.

PMB 300, 4201 Church Road

Mount Laurel, NJ 08054

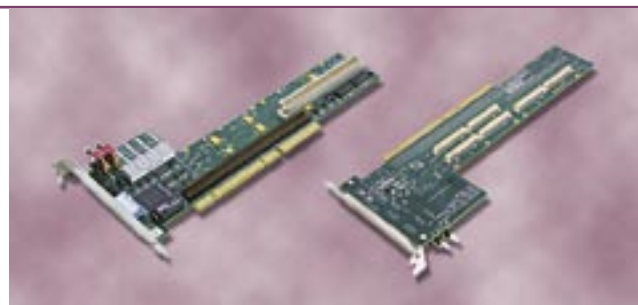
Tel: 609-267-8988 • Fax: 609-261-1011



4311

www.technobox.com

The Metering PMC-X to PCI-X Adapter is a development tool for debugging and/or demonstrating a PMC-based solution in a PCI slot. Both PCI signaling (32/64-bit, 33/66-MHz) and PCI-X signaling (32/64-bit, 66/100/133-MHz) are supported. A PMC I/O card (PIM) can also be attached to the adapter. When mounted, the PMC or PIM is vertically oriented, exposing the bulk of the component areas for probing. A unique feature of the extender is its metering function used to measure power voltages and current. A built-in frequency counter measures PCI bus clock frequency. Modes include real-time, minimum and maximum value capture, range display, and averaging. XCAP and M66EN signals are supported.



FEATURES:

- PMC-X to PCI-X adapter with bus metering functions
- Supports PCI (33/66) and PCI-X (66/100/133)
- Accommodates both PMCs and PIMs
- Multiple metering functions with LED readout
- Optimized design to preserve signal quality
- XCAP and M66EN signal support

For more information, contact info@technobox.com.

RSC #10401 @www.vmebus-systems.com/catalogrsc

Technobox, Inc.

PMB 300, 4201 Church Road

Mount Laurel, NJ 08054

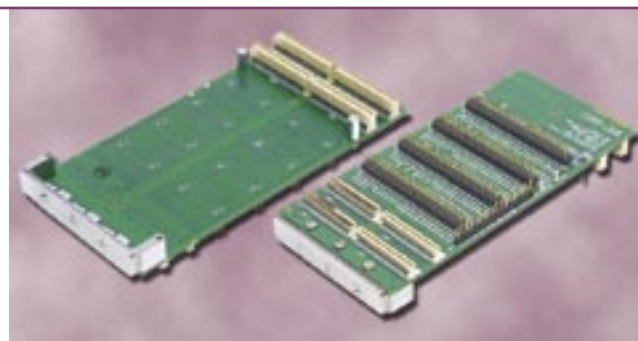
Tel: 609-267-8988 • Fax: 609-261-1011



4320

www.technobox.com

The Basic Common Mezzanine Card (CMC) extender provides a means to extend mezzanine boards for signal accessibility, including PrPMC (VITA 32), PMC (IEEE 1386.1), PMC-X (VITA 39), and any other CMC-derived board. Use of the 4320 sufficiently extends the PMC beyond the front panel of a VME or CompactPCI board and exposes the majority of the board under test for probing. The extender supports 3.3V and 5V PCI-bus signaling, 33-MHz and 66-MHz clock speeds, and either 32-bit or 64-bit bus widths. A 10-layer design assures optimum performance and signal quality. Four headers on the extender provide access to bus and rear I/O signals. A row of turret test points is also provided.



FEATURES:

- Extends PMC, PrPMC, or PMC-X board for test access
- Direct access to bus and rear I/O signals
- Headers and test points for logic analyzer
- Supports 33/66-MHz, 32/64-bit modes
- 3.3-volt and 5-volt bus signaling
- Optimized 10-layer design preserves signal quality

For more information, contact info@technobox.com.

RSC #10402 @www.vmebus-systems.com/catalogrsc

MEN Micro

3740 N. Josey Lane, Suite 203

Carrollton, TX 75007

Tel: 972-939-2675 • Fax: 972-939-0055

**B12 3U PowerPC SBC**www.menmicro.com

The B12 is a 3U industrial SBC capable of operating in the harsh environmental conditions often encountered by transportation systems. Featuring a 66-MHz PowerPC MPC823e, the B12 has 32 MB of SDRAM and up to 32 MB of Flash. In addition, 32 KB of nonvolatile FRAM can be used to store operating data. Also included are two RS-232 ports and a 10Base-T Ethernet interface. Optically isolated interfaces include three CAN controllers and one RS-422/485 port. The B12 can function as a VMEbus master or slave. It has a real-time clock, temperature sensor, and voltage supervisor. The B12 meets or surpasses all of the requirements of EN50155, the European railway performance standard.

**FEATURES:**

- MPC823e Motorola PowerPC
- 32 MB of SDRAM
- Two RS-232, Enet, IDE, three CAN, one RS-422/485
- One M-Module mezzanine slot
- Operating temperature range: 0°C to +60°C or -40°C to +85°C
- Compliant w/European railway standard (EN50155)

For more information, contact egodsey@menmicro.com.RSC #10501 @www.vmebus-systems.com/catalogrsc**2E SysCom, Inc.**

86 Kendall Ave.

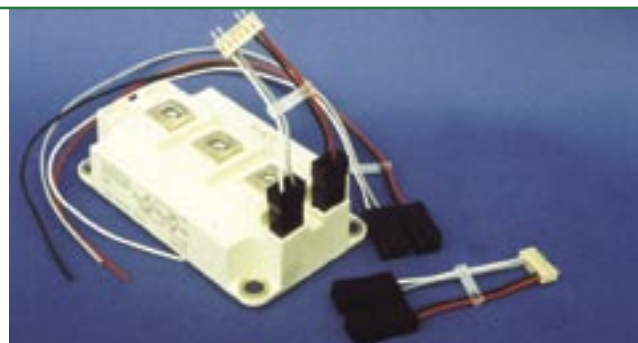
Framingham, MA 01702

Tel: 508-620-1678 • Fax: 508-935-2286

**IGBT Connectors**www.2esyscom.com

Designed specifically for attaching to the spade terminals on IGBT modules, the connector and cable assembly provided by 2E SysCom are used to connect IGBT power modules to a printed circuit board. Suitable for two faston tabs, 2.8mm x 0.5mm, the connectors are made with integrated automatic locking clips built in. Three grid spacings for faston tabs are available (4.0mm, 4.7mm, and 6.00mm).

Wires are 20 AWG (0.35mm) stranded, rated at 250V operating voltage and for a temperature range of -25°C to +85°C. Color coded red, black, grey, and white, the wires are separated by a spacer and terminated in a four-pin PCB mount connector. Connector housings are also available separately for in-house assembly.

**FEATURES:**

- IGBT connector and cable assembly
- Standard 20 AWG stranded wire
- Operating voltage of 250V
- Temperature rating for -25°C to +85°C
- UL 94 V-0 rated
- Operating current 50mA

For more information, contact 2e@2esyscom.com.RSC #10502 @www.vmebus-systems.com/catalogrsc

Synergy Microsystems, Inc.

9605 Scranton Road, Suite 700

San Diego, CA 92121

Tel: 888-479-6374 • Fax: 858-452-0060



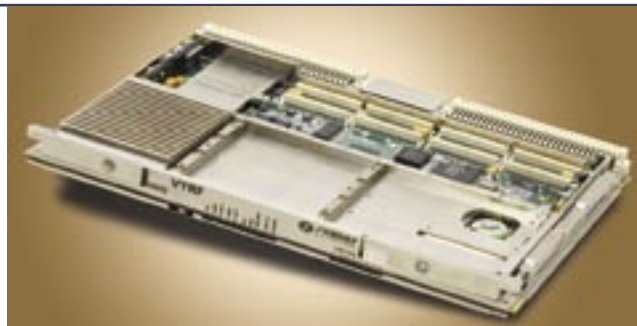
Rhino DX (VYRD)

www.synergymicro.com

Rhino DX (VYRD) is Synergy's most powerful and feature-rich, conduction-cooled single board computer to date. This board offers one or two PowerPC 7457 CPUs at speeds up to 1.3 GHz. The Rhino DX complements the 7457 with the Discovery system/memory controller – integrating fast memory, dual PCI buses, and abundant I/O functionality on a single chip.

Rhino DX also features onboard StarFabric – a point-to-point switched fabric interconnect that provides 2.5 Gbps, full-duplex, board-to-board communication. In addition to the two StarFabric interfaces, the Rhino DX provides multiple serial, Ethernet, and FireWire interfaces, and two PMC sites.

OS support includes VxWorks, INTEGRITY, and Linux.



FEATURES:

- Conduction-cooled and fully ruggedized SBC
- Single or dual PowerPC 7457, up to 1.3 GHz
- 1 GB SDRAM with ECC and 1 GB NAND Flash
- Dual 2.5 Gbps StarFabric interfaces
- Onboard serial (4), Ethernet (2), FireWire (2)
- Software support for VxWorks, INTEGRITY, and Linux

For more information, contact sales@synergymicro.com.

RSC #10601 @www.vmebus-systems.com/catalogrsc

General Micro Systems, Inc. (GMS)

8358 Maple Place

Rancho Cucamonga, CA 91730

Tel: 800-307-4863 • Fax: 909-987-4863



V269 "Equinox"

www.gms4sbc.com

The V269 Equinox is the industry's fastest Dual Pentium® 4 Single Board Computer. Offering low power, ultra high performance, and high-resolution video for command, control, and display, the V269 is ideal for applications requiring upgradable processor horsepower and exceptional bus speed. The V269 supports four independent PCI-X buses, each capable of operating at 133 MHz, delivering the ultimate in I/O bandwidth without the use of bridging devices. The V269 supports Legacy 3-row VME with front-panel I/O or VME64x with rear I/O. With its high performance dual CPUs and vast customizable I/O functions, the V269 Equinox is the ideal choice for high performance and low power applications.



FEATURES:

- Dual Intel® Xeon™ Pentium® 4 processors
- Supports two 50W processors
- Up to 8 GB of low-cost DDR DIMM SDRAM memory
- Dual Gigabit Ethernet ports
- Ultra Wide SCSI 160/320

For more information, contact information@gms4sbc.com.

RSC #10602 @www.vmebus-systems.com/catalogrsc

OBSOLETE



HP E1410A
6 1/2 Digit Multimeter

Evolution



ASCOR Model 38xx
6 1/2 Digit Dmm

ASCOR's 38xx Equivalent To 1410.



- E1410 Plug & Play Compatible
- 6 1/2 Digit Full Function AC/DC, Current, Ohms
- Frequency
- Capacitance
- Inductance
- AC/DC Source

Call us at 510.490.2300 to receive a product catalog or visit us at:
<http://www.ascor.com/dmm>



Because Your System Deserves It

ASCOR Incorporated 4384 Enterprise Place Fremont, CA 94538-6365 Telephone: 510.490.2300 Fax: 510.490.8491
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VME NEW PRODUCTS

By Chad Lumsden
newproducts@opensystems-publishing.com



VME NEW PRODUCTS

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BACKPLANE: SWITCHED FABRIC

Hybricon Corp.

Website: www.hybricon.com

Model: VXS Backplanes **RSC No:** 17881
A family of VXS switch fabric backplanes • Tested to 320 MBps per VITA 1.5 2eSST • Constructed in a 20-layer, low-noise stripline design with the outside layers incorporating a chassis ground EMI shield • Stiffeners placed every two slots to ensure board rigidity • Two VITA 41.x fabric slots and up to 18 VITA 41.x payload slots with 4x links to two switch slots • 21-slot versions available for VITA 41.1-200x VXS InfiniBand protocol layer standard and VITA 41.2-200x VXS Serial RapidIO protocol layer standard • Custom configurations from 2 to 21 slots available

BRIDGE: OTHER

CAEN

Website: www.caen.it

Model: V1718 **RSC No:** 17823
A single-width, 6U, VME-to-USB 2.0 bridge • Operated from the USB port of a standard PC • VME master (arbiter or requester) • VME slave (registers and test RAM access) • Operates as system controller when in Slot 1, acting as a bus arbiter in multi-master systems • Drivers support Windows 98/2000/XP and Linux • Includes example software

CARRIER BOARD: IP (INTELLIGENT)

MAX Technologies, Inc.

Website: www.maxt.com

Model: VME-400

RSC No: 17656

High performance, multi-protocol VME solution • Supporting up to four 8/32 MHz Industry Pack (IPack) modules • Powered by a StrongArm 200 MHz RISC processor and comes with 1-2 Mbytes of SRAM and 16 Mbytes of shared memory, permitting it to buffer and process high-bandwidth communication between the VME host and the IPack interface modules • Onboard firmware allows scheduling of transmit messages and time-tags received messages with 32-bit microsecond precision, without requiring real-time intervention from the host system • Multiple carrier boards can be time-synchronized resulting in unmatched precision in critical real-time applications

CARRIER BOARD: M-MODULE

Advanced Vehicle Technologies, Inc.

Website: www.avt-hq.com

Model: AVT-512

RSC No: 13824

Double wide M-Module • Electrical isolation (rev B) • More than one can be installed in a single VXI chassis slot • Very small and powerful • Complete unit, nothing else to buy or install

CONNECTOR: OTHER

SBS Technologies, Inc.

Website: www.sbs.com

Model: 8x0 Series bus adapters **RSC No:** 17856
70 MBps data transfers using Controller Mode DMA • Memory-mapping enables transparent remote access with 2 microsecond latency • Fiber Optic cables allow distances of up to 500 meters • Transparent Interrupt Passing • Device drivers for Linux, VxWorks, Windows XP/2000, Solaris, IRIX • VME64 Bus Adapters for VME64 to VME64, PCI, PMC, or CompactPCI

DATA ACQUISITION

Thales Computers

Website: www.thalescomputers.com

Model: PMC-FPDP

RSC No: 17791

A PMC with a Front-Panel Data Port (FPDP) for high-speed data acquisition • Designed to provide high-speed data acquisition in VME or CompactPCI SBCs used for DSP • Available in air-cooled (SA), rugged air-cooled (RA), and rugged conduction-cooled (RC) versions • FPDP interface compliant with ANSI/VITA-17 • Based on the PLX PCI 9656 chip, which provides a 32/64-bit, 33/66 MHz interface with a linked-list DMA engine, enabling throughput speeds of more than 100 MBps • Control logic handled by a user-programmable Altera EP1S10 FPGA with a large (64 KB maximum) integrated FIFO • Available with either a TTL

(FPDP-compliant) or EIA-422 electrical interface • Software support for LynxOS 4.0 under a no-copy, low-latency Virtual Interface/Direct Deposit Interface (VI-DDlink)

RSC 17791



DATACOM: ETHERNET

Radstone Technology Corporation

Website: www.radstone.co.uk

Model: GBX16

RSC No: 17872

A full Layer 2 and Layer 3, managed Gigabit Ethernet switch in 6U VMEbus form factor • 16 ports with optional fiber connection • Layer 2 and 3 management supports VLANs and QoS • Provides guaranteed bandwidth channels • 32 Gbps no-blocking switch fabric with full wire-speed performance • Complies with 802.x flow control • Available in air-cooled and conduction-cooled versions and is fully qualified for operation between -40°C to +85°C

RSC 17872



DSP RESOURCE BOARDS: VMEBUS

Radstone Technology Corporation

Website: www.radstone.co.uk

Model: G4DSP-XE

RSC No: 17882

A 6U VMEbus DSP board • Four 1 GHz, MPC7447 processor-based compute nodes • AccelerX, 100 MHz, loosely coupled PCI-X architecture • 256 MB of DDR SDRAM and 32 MB of Flash per compute node • Two bridged PMC sites • Two StarFabric ports at P0 • Message passing accelerator • Time stamping of data • Four Gigabit Ethernet ports • Supports VxWorks with VxMP, Integrity, LynxOS, VSIPL, RMP, and BIT • Air-cooled and conduction-cooled versions available

ENCLOSURE + CARD RACK

Aurora Technologies

Website: www.auroratech.com

Model: XP-SB

RSC No: 17795

A PCI expansion chassis that uses StarGen's switch fabric PCI bridging technology • PCI-to-StarFabric interface allows multiple chassis to be connected • Compatible with CompactPCI, PCI, and VME host systems • Consists of a PCI or an optional PMC host card and a 1U rackmount chassis housing two (XP2-SB) or three (XP3-SB) PCI slots; a second chassis can be added for a total of four or six slots • Compliant with PCI 2.2 specifications • XP2-SB supports 3.3V and universal-voltage PCI cards; the XP3-SB supports 5V and universal-voltage PCI cards • Compatible with 64-bit/66-MHz and 32-bit/33-MHz bus speeds • Supports SPARC Solaris, Solaris x86, Windows 2000/XP, and Linux • Two 2.5 Gbps full-duplex links can be bundled to form a 5 Gbps full-duplex link • Four aggregate 622 Mbps LVDS pairs comprise each link

ENCLOSURE + CARD RACK + POWER SUPPLY

American Rugged Enclosures, Inc. (ARE)

Website: www.areinc.com

Model: Composite ATR Enclosure

RSC No: 17615

Convection cooled ATRs combine space efficient industry standard ARINC dimensions with the technology to support the use of conventional cooled VMEbus boards • ARINC 404A mounting • Rugged VME, VME64X, and CompactPCI backplane standard architecture • EMC performance to MIL-STD 461D • High speed, high efficiency fans • Customer specified I/O configuration panels • AC/DC power supply's up to 750W • Designed to Meet MIL-STD 810D • Shock: 25 Gs / Vibration: 15 Gs • Optional shock tray for improved shock and vibration • Captive stainless steel hardware • User friendly no burrs/sharp edges • Lightweight (40% less than Aluminum) • Custom designs available • SEM-E format and custom panels available

Hybricon Corp.

Website: www.hybricon.com

Model: SRME 4U Enclosures

RSC No: 17624

4U, 19 Inch rack-mount enclosure • Supports up to 8 slots • CompactPCI, VME64x and VME backplanes available • IEEE 1101.10/11 compliant card cage • Pac-2000 modular design • Advanced cooling design • Patented CoolSlot air deflecting card guides optimize airflow • Hot swap removable side fan tray with high performance DC fans • Side-to-side airflow path • Cooling of both front cards and rear transition cards • Thermal simulation of enclosure (thermal report available) • 10.4 CFM (600 LFM) per front slot average, sufficient to cool 1 to 3 power supplies and 80W per front slot • 6 CFM (500 LFM) per rear transition card cools 50W per slot • Supports optional in-rack peripheral devices

Kaparel Corporation

Website: www.kaparel.com

Model: Rack-Mounted System

RSC No: 17569

Vented subrack, 405mm deep, for installation in 482.6mm (19") enclosures or cases • Prepared to accommodate VMEbus boards and drives. Complies with IEC 60 297-3 and IEEE 1101.1/1101.10 • Option of installing 12 double-Euroboards (6Ux160mm) • For the installation of drives: 32HP, 36HP (for VME64x) • Integral 400W power supply with wide-range input • Including VME64x J1/J2 backplane 12 slots • Front horizontal rails with 10mm extension for injector/extractor handle (w/VME64x) • Keyable plastic guide rails (for

RSC 17795



VME64x) • Cooling from bottom to top • Forced ventilation w/3 DC fans • EMC protection, due to conductive surface finish on all components and EMC gaskets • Fully assembled, pre-wired and tested • Modifications for custom solutions are available

Model: Rack-Mounted System RSC No: 17570

Vented subrack, 290.5mm deep, for installation in 482.6mm (19") enclosures or cases • Prepared to accommodate VMEbus boards and drives • Complies with IEC 60 297-3 and IEEE 1101.1/1101.10 • Option of installing 12 Euroboards (6U x 160mm), recessed • For the installation of drives or additional power supply units: 24HP • Integral power supply unit, plug-in type, 6U/12HP, 270W • Including VME64x backplane, 12 slots • Option of installing 12 I/O modules at the rear • Front horizontal rails with 10mm extension for injector/extractor handles • Keyable plastic guide rails • Cooling from front to rear • Forced ventilation with two RiCool radial fans, 12 V/48W (may be pulled out forwards) • EMC protection, due to conductive surface finish on all components and EMC gaskets • Fully assembled, pre-wired and tested

Switched Fabric Ethernet

VITA 31.1 (VME) or PICMG 2.16 (CPCI) Ethernet Switched Fabric Platform

ACT/Technico's Ethernet Switched Platform includes typical items required to establish an Embedded System Area Network (ESAN):

- 6 or 9 slot tower enclosure for development (rackmount also available)
- Backplane provides two PICMG 2.16 switched fabric slots
- 300 W power supply
- PICMG 2.16 or VITA 31.1 compatible SBCs:
 - Choice of PowerPC or Pentium platform
 - Extended Temp Range available
- One or two switches: up to 24 ports 10/100 or Gigabit Ethernet (extended temp & conduction cooled available)
- Option to add standard or rugged mass storage devices: PMCSstor, PMCDisk, CPCISstor or VME Disk Modules



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on PICMG 2.16
or VITA 31.1
SBCs

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- Message Processing
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RSC# 109 @www.vmebus-systems.com/rsc

VME NEW PRODUCTS

Model: Slim-Box-AC System **RSC No:** 17568
1U, 2U, 3U or 4U rack-mounted enclosure with 482.6 mm (19") mounting brackets (may be offset approximately 100 mm to the rear) • 2/4 or 6/8 slots for VME boards at the front and rear • Enclosure cooling from left to right • EMC and ESD-compatible configuration • Integral Monolithic VME64x backplane • Power input module • Including fan for 1U – 4U • Hot-swap compatible power supply units with current splitting for redundancy operation (2U) • Custom versions available on request • Conforms to IEEE 1101.1/10/11, VITA-1, VITA-1.1 • AC – DC

RSC 17568



FIELDBUS: CAN

Tews Technologies LLC

Website: www.tews.com **Model:** TPMC316 **RSC No:** 17768
Conduction cooled single-width 32 bit PMC module conforming to IEEE P1386.1, no front panel • PCI 2.1 compliant interface • Board size: 144mm x 74mm • Two CAN bus interfaces based on Intel 82527 chip • Support CAN specification 2.0 part A and B (standard and extended data frames) • Programmable global mask • 15 message objects of 8 byte data length • Powerful error handling • Programmable transfer rates • Physical interface CAN High Speed (according to ISO 11 898) on TPMC316-10 or modified RS-485 on TPMC316-11 per channel • Physical interface optically isolated from CAN controller by onboard DC/DC converter and opto coupler per channel • Transfer rate 1 Mbps maximum • Operating temperature range –40°C to +85°C

GENERATORS: NOISE

Noise Com, Inc. (WTC)

Website: www.noisecom.com **Model:** VX17000 Series **RSC No:** 17607
Contain a Noise Com amplified noise source that is tuned to provide the best flatness at the instrument output • The amplifier is optimized to deliver an unsaturated output with a Gaussian amplitude distribution • Noise output power level can be adjusted from 0 to 127dB in 1dB (and optionally 0.1dB) steps • The output state is controlled by an RF switch • In the standby state, the noise is terminated into an RF load and, in the on state, it is directed to the output connector • The instrument's flexible architecture allows many options to be specified • Switched filter bank • Allows up to four filters in the noise path • The filters can be specified in any combination of bandpass, low-

pass, highpass, or notch • A thru-line and set of terminations (RF loads) are also included • Output combiner allows the user to inject a signal and add a controlled amount of noise • Signal attenuator available in 0.1 or 1 dB steps to 127 dB

GRAPHICS

Themis Computer

Website: www.themis.com **Model:** TGA3D+ Graphics Adapter **RSC No:** 16346
Onboard 3-D geometry accelerator • Onboard rasterization engine • 32 MB frame buffer memory • 16 MB texture memory • Up to 8.5 million triangles per second • Up to 160 million textured pixels per second tri-linear fill ratio • Stereoscopic graphics support up to 960x680, 1152x900, 1280x800 • True color, double and Z-buffering up to 1920x1080 • 32-bit Z-buffering at all resolutions • Support for up to two TGA3D+ boards • Onboard 64-bit/33 MHz or 64-bit 66 MHz (if TGA3D+ is plugged into a PCI 66 MHz enabled baseboard) PMC slot • Operating resolutions: 640x480 to 1920x1080 • Solaris 8 & 9 support • Sun OpenGL for Solaris 1.2.1 and later

I/O: ANALOG

Tews Technologies LLC

Website: www.tews.com **Model:** TPMC550 **RSC No:** 17833
A standard single-width 32 bit PMC module conforming to IEEE P1386.1 • PCI 2.1 compliant interface • Board size: 149mm x 74mm • eight or four channels of isolated 12 bit analog outputs • Settling time to 0.012% is 10µs maximum • Full-scale output range ±10V or 0-10V • Factory calibrated • Calibration information stored in EEPROM

RSC 17833



I/O: DIGITAL

Acromag, Inc.

Website: www.acromag.com **Model:** PMC-DX501/DX2001 **RSC No:** 17876
An FPGA-based TTL I/O module • 64 bidirectional TTL I/O lines • Reconfigurable Virtex II FPGA with 500 KB or 2 MB system gates • Up to 1 MB of RAM within the FPGA • 256 KB x 36-bit onboard SRAM • Fast PCI interface with 32-bit/66-MHz dual DMA support • Extended temperature option

Model: PMC-DX502/DX2002 **RSC No:** 17877
An FPGA-based differential I/O module • 32 bi-directional RS-422 differential I/O lines • Reconfigurable Virtex II FPGA with 500 KB or 2 MB system gates • Up to 1 MB of RAM within the FPGA • 256 KB x 36-bit onboard SRAM • Fast PCI interface with 32-bit/66-MHz dual DMA support • Extended temperature option

Model: PMC-DX503/DX2003 **RSC No:** 17878
An FPGA-based TTL and differential I/O module • 16 TTL and 24 RS-422 differential I/O lines • Reconfigurable Virtex II FPGA with 500 KB or 2 MB system gates • Up to 1 MB of RAM within the FPGA • 256 KB x 36-bit onboard SRAM • Fast PCI interface with 32-bit/66-MHz dual DMA support • Extended temperature option

I/O: MULTIFUNCTION

Tews Technologies LLC

Website: www.tews.com **Model:** TPMC680 **RSC No:** 17838
Standard single-width 32 bit PMC module conforming to IEEE P1386.1 • PCI 2.1 compliant interface • Board size: 149mm x 74mm • 64 interrupt generating digital I/O lines • 64 bit TTL I/Os arranged in 8 x 8 bit ports • Direction programmable per 8 bit port • TTL signaling voltage (maximum current: 6mA) • ESD and overvoltage protection for each I/O line • I/O access • 64 I/O lines on HD68 front connector, parallel to 56 I/O lines [55:0] and system ground on rear connector P14 • Basic operating modes – byte I/O and two handshake modes • Temperature range: –40°C to +85°C

RSC 17838



MEZZANINE: PRPMC

Interface Concept

Website: www.interfaceconcept.com **Model:** IC-PQ2-PMCb **RSC No:** 17630
PPC603e with FPU 32 bits RISC architecture with 266 MHz CPU • 16 KB Instruction cache and 16 KB data cache • 64 KB onboard fast dual-port SRAM • MMU and FPU capabilities • DMA-channel controllers • 64 or 128 MB of shared SDRAM with ECC • 128 KB SRAM • 8 or 32 MB of NOR Flash EPROM • 32 KB SPI EEPROM • Real-time clock and four 32 bit-timers • PCI interface initiator, target and Host, 32 bits @ 33 MHz • 3.3V only PCI signaling Rev 2.2 I/O subsystem • Up to three Ethernet 10/100TX auto-sensing ports are routed to rear connector • On the rear I/O Pn4 and reverse Pn3 connectors • 4 Multipurpose serial controller SCC [1..4] • USB on SCC4 • I2C bus (400Kbs), SPI and one RS232 serial port • On the reverse Pn3, several general logical I/O • JTAG/COP and SMC1 options on the debug connector • 128 or 256 MB soldered Flash disk • Time of day Calendar clock • Supercap for calendar clock and backup SRAM • Reverse Pn3 to mezzanine board connection

RSC 17630



MOTION CONTROL

Tews Technologies LLC

Website: www.tews.com **Model:** TPMC118 **RSC No:** 17767
A standard single-width 32 bit PMC module conforming to IEEE P1386.1 for motion control appli-

cations • Conforms to IEEE P1386.1 • PCI 2.1 compliant interface • six-channel motion controller with 32 bit up/down counter with preload and output register • Optocoupler for galvanic isolation • On board DC/DC converter to supply isolated part of encoder interface • six digital inputs, 24V reference input or general purpose input depending on mode • six analog outputs, $\pm 10V$ 16 bit DAC followed by operational amplifier • Operating temperature 0° to +70°C

PROCESSOR: PENTIUM

GE Fanuc Automation Americas, Inc.

Website: www.gefanuc.com/embedded

Model: VMIVME-7658

RSC No: 17619

Dual slot, dual Pentium III processor-based VMEbus controller • Based on ServerWorks LE chipset with 133 MHz system bus • Special features for embedded applications • Up to 1 GB bootable Flash on secondary IDE (optional) • Software selectable watchdog timer with reset • Two programmable 16-bit timers and two programmable 32-bit timers • Remote Ethernet booting • Supports VMEbus P2 connection to HD/floppy drive • 64-bit, 66 MHz PMC mezzanine expansion site (IEEE-P1386 common mezzanine card standard, 3.3V) • VME64 modes supported A32/A24/D32/D16/D08 (EO)/MBLT64/BLT32 • VMEbus interrupt handler, interrupter and system controller • Includes real time endian conversion hardware for little-endian and big-endian data interfacing (patent no. 6,032,212) • Enhanced bus error handling • Passive heat sink • Standard features include • Dual Pentium III processors (up to 1.26 GHz) with advanced transfer cache • Up to 2 GB PC-133 registered SDRAM with ECC • 64-bit PCI SVGA controller with 4 MB internal/SDRAM • 133 MHz system bus • Two Fast Ethernet controllers supporting 10BaseT and 100Base-TX interfaces • Ultra DMA/66 hard drive and floppy drive controllers (use VMEbus P2 for connection to IDE/floppy) • PCI Ultra320 SCSI interface • Two high performance 16550-compatible serial ports • Enhanced parallel port with ECP/EPP modes supported • Shared PS/2-style keyboard and mouse port on front panel • Real time clock and miniature speaker included • Two front panel universal serial bus (USB) connections • Operating system support available: • Windows XP/Windows 2000 • Linux

Model: VMIVME-7700

RSC No: 17620

Intel's Ultra Low Voltage Celeron 400 MHz/650 MHz processor • Special features for embedded applications include: • Up to 1GB bootable Flash on secondary IDE (optional) • Two 16-bit and two 32-bit programmable timers • 32 KB of nonvolatile SRAM • Software-selectable watchdog timer with reset • Remote Ethernet booting • One PMC expansion site (IEEE-1386.1 PCI mezzanine card standard, 5V) • VME64 modes supported: A32/A24, D32/D16/D08(EO), MBLT64/BLT32 • VMEbus interrupt handler, interrupter, and system controller • Includes real-time endian conversion hardware for little-endian and big-endian data interfacing (patent no. 6,032,212) • Enhanced bus error handling • Passive heat sink • Real-time clock and miniature speaker included • Dual front panel universal serial bus (USB) connections • Standard features include: • Up to 512 MB PC100 SDRAM • 100 MHz system bus via Intel 815E chipset • Dual Ethernet controllers supporting 10Base-T and 100Base-TX interfaces • Ultra DMA/100 hard drive and floppy drive controllers (uses VMEbus P2 for connection to IDE/floppy) • Two high performance 16550-compatible serial ports • PS/2-style keyboard and mouse ports on front panel • VMEbus backplane interface • User programmable watchdog timer • Passive processor heat sink

PROCESSOR: POWERPC

GE Fanuc Automation Americas, Inc.

Website: www.gefanuc.com/embedded

Model: VMIVME-7050

RSC No: 17621

High performance PowerPC-based single board computer (SBC) • IBM 750FX/GX PowerPC processor (733 MHz to 1.0 GHz) • Marvell MV64360 system controller with 2 MB integrated SRAM • Dual 64-bit PCI-X on PMC expansion sites (backward compatible) with support for doublewide PMC card • Features include • Up to 2 GB of DDR SDRAM with ECC running at 133 MHz, PC2100 (without losing any PMC expansion capabilities) • 512 KB on-chip L2 cache • 64.5 MB total bootable Flash (64 MB soldered down, 512 KB in PLCC32 socket) • Ultra-DMA IDE controller to CompactFlash Socket (Type 1) • 32K NVRAM • Realtime clock • Built-in self test • Two high performance (up to

10 MB/s per channel) 16550-compatible serial ports (supporting synch/asynch RS-232, RS-422, and RS-485) • Dual 10/100/1000 Ethernet (two on front panel RJ45, two out P2) • Four 32-bit programmable timers • One 32-bit watchdog timer • Full 64-pin PMC I/O support for both PMC sites through VMEbus P0 & P2 (P0 offers controlled-impedance for high speed connectivity such as Firewire and Ultra320 SCSI) • 64-bit PCI board-to-board connector for PMC and feature expansion • Monitoring of temperature and voltages • Passive heatsink • No moving parts to fail (excluding optional microdrive) • Operating system support available: • VxWorks • Linux

Motorola Computer Group

Website: mcg.motorola.com

Model: MVME5500

RSC No: 17622

MPC7455 PowerPC processor at 1 GHz • 256 KB of on-chip L2 cache and 2 MB of L3 cache •



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VME NEW PRODUCTS

AltiVec coprocessor for high-performance computational applications • 512 MB of onboard 133-MHz SDRAM ECC memory and 512 MB additional memory via a memory mezzanine card for a total of 1 GB of memory • Two banks of soldered Flash memory, 32 MB and 8 MB • Dual independent 64-bit PCI buses and PMC sites with a bus speed of up to 66 MHz • Gigabit Ethernet interface plus an additional 10/100Base-TX Ethernet interface • 64-bit PCI expansion mezzanine connector allowing up to four more PMCs • I/O compatibility with MVME51xx family • Single VME slot even when fully configured with two PMC modules or one PMC module and an add-on memory mezzanine • Supports processor PMCs (PrPMCs)

Model: MVME6100

RSC No: 17623

2eSST VMEbus protocol with 320 MBps transfer rate across the VMEbus • Migration path from existing Motorola VMEbus platforms • High-performance MPC7457 PowerPC processor run-

ning at 1.267 GHz; suitable for data-intensive applications • 128-bit AltiVec coprocessor for parallel processing • Up to 1 GB of onboard DDR ECC memory • Two 33/66/100-MHz PMC-X sites allow the addition of industry-standard, application-specific modules • Dual Gigabit Ethernet interfaces • 128 MB of Flash memory in two 64-MB banks

Synergy Microsystems, Inc.

Website: www.synergymicro.com

Model: Manta QX

RSC No: 17626

Air-cooled, 6U VME single-board computer • Quad PowerPC 7457 CPUs • Up to 1.3 GHz • Symmetric Multiprocessing (SMP) architecture • Up to 2 MB L3 cache per CPU plus 2 MB private memory • 133 MHz integrated memory/system controller • Up to 2 GB DDR SDRAM • Up to 64 MB Flash (NOR) • Up to 1 GB Flash file (NAND) • StarFabric Switch Fabric interconnect • One 64-bit PMC site • I/O: Gigabit Ethernet (2), serial (4) and IEEE 1394 (2) • Two 64-bit PCI buses • Multiple temperature and ruggedization levels • DSP ready with Synergy's Math Library • VxWorks, INTEGRITY, or Linux SMP

Model: Raptor MX

RSC No: 17627

Air-cooled, 6U VME single-board computer • PowerPC 7455/57 with AltiVec up to 1.3 GHz

RSC 17626



• Single or dual CPU • Up to 2 MB L3 backside cache plus 2 MB private memory • 100/133 MHz integrated system/memory controller • Dual 64-bit PCI buses • Up to 1 GB SDRAM with ECC • Up to 64 MB Flash (NOR) • Up to 512 MB Flash (NAND) • Two 64-bit PMC sites • Two dual-redundant MIL-STD-1553 ports • I/O: serial (6), IEEE 1394 (2), 10/100 Ethernet (3), and USB 2.0 (2) • Multiple temperature and ruggedization levels • DSP ready with Synergy's Math Library • VxWorks, INTEGRITY, or Linux (SMP)

Model: Rhino DX

RSC No: 15036

Conduction-cooled, 6U VME single-board computer • PowerPC 7455/57 with AltiVec TM up to 1.3 GHz • Single or dual CPU • Up to 2 MB L3 backside cache plus 2 MB private memory • 100/133 MHz integrated system/memory controller • Dual 64-bit PCI buses • Up to 1 GB SDRAM with ECC • Up to 64 MB Flash (NOR) • Up to 1 GB Flash File (NAND) • StarFabric TMbridge switch fabric interconnect • two 64-bit/66 MHz PMC sites • I/O: serial (4), IEEE 1394 (2), and 10/100 Ethernet (2) • Meets MIL-STD-810F • DSP ready with Synergy's Math Library • VxWorks, INTEGRITY, or Linux

Model: Rhino MX

RSC No: 17628

Conduction-cooled, 6U VME single-board computer • PowerPC 7455/57 with AltiVec up to 1.3 GHz • Single or dual CPU • Up to 2 MB L3 backside cache plus 2 MB private memory • 100/133 MHz integrated system/memory controller • Dual 64-bit PCI buses • Up to 1 GB SDRAM with ECC • Up to 64 MB Flash (NOR) • Up to 512 MB Flash (NAND) • Two 64-bit PMC sites • Two dual-redundant MIL-STD-1553 ports • I/O: serial (6), IEEE 1394 (2), 10/100 Ethernet (2), and USB 2.0 (2) • Meets MIL-STD-810F • DSP ready with Synergy's Math Library • VxWorks, INTEGRITY, or Linux

Thales Computers

Website: www.thalescomputers.com

Model: PowerEngine7 RA/RC

RSC No: 17792

Air-cooled (RA) and conduction-cooled (RC) rugged versions of the PowerEngine7 SBC • Single or dual PowerPC 750FX processors at 700 MHz, providing more than 1,600 Dhrystone 2.1 MIPS • Up to 512 MB SDRAM memory and up to 128 MB of Flash memory • Avignon host bridge system controller • ALMA2e VME-to-PCI bridge allows 2eSST transfers • Two PMC slots (one 64-bit/66-MHz and one 32-bit/33-MHz) • Two Ethernet interfaces • Up to six serial ports • RA version operates from

RSC 17792



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RSC# 112 @www.vmebus-systems.com/rsc

-40°C to +75°C; RC version operates from -40°C to +85°C • Supports VxWorks for Tornado 2.2 and 2.0.2, LynxOS4, and the Linux 2.4 kernel

PROCESSOR: SPARC

Themis Computer

Website: www.themis.com

Model: USPIIe-USB

RSC No: 13731

6U VME64 engine with 64-bit 550 MHz UltraSPARC IIe or 64-bit 650 MHz UltraSPARC III processor technology • 512 KB L2 cache memory • High performance Tundra 64x Tundra VME64 interface • 128 Mbytes to 4 Gbytes SDRAM memory • Three USB 1.0 ports (two on front panel, one at rear of board) • Up to four PMC (3.3/5V) expansion slots: one on baseboard, up to three additional PMC slots on optional I/O expansion boards • Up to two 10/100Base-T Ethernet ports, one on baseboard, one on optional USPIIe-USB/2P2 • Two 80 MB/sec Ultra2 LVD SCSI ports • Up to six serial ports: four RS232 serial ports on baseboard, two additional serial ports on optional I/O USPIIe-USB/2P2 expansion board • Audio port on optional USPIIe-USB/2P2 – sample rate 48 KHz, 16-bits • Front-panel software user selectable, 16-position rotary switch on I/O expansion on optional USPIIe-USB/2P2 • USB, IBM PS/2 keyboard and mouse ports • Injectors – both VME64 and traditional VME injectors are available • 64-bit Solaris 8 and 9 OS support

ROUTERS/SWITCHES

Dy 4 Systems

Website: www.dy4.com

Model: SVM/DMV-680

RSC No: 17577

Fully managed, intelligent multi-layer gigabit Ethernet switch with 6U VME64 form factor • Up to twenty four 10/100/1000 Mbps non-blocking auto-negotiating ports operating at wire-speed • Flexible port combinations – four Gigabit Ethernet, four Fiber Optic or four Fast Ethernet • Dual Broadcom BCM5690 managed switch devices with a Motorola MPC8245 control and management processor • 64 Mbytes SDRAM with ECC, 4 Mbytes boot Flash, 32 Mbytes configuration Flash • Out-of-band backplane management and debug port (10/100 Ethernet), JTAG support, and serial interface • Fully integrated Layer 2 switching, Layer 3 routing, Quality of Service (QoS), IP multi-cast, security and network management • Intuitive command line interface, web interface and SNMP interface for easy configuration and network management • Air-cooled and conduction-cooled versions available

Interface Concept

Website: www.interfaceconcept.com

Model: ComEth4100

RSC No: 17631

Provides up to 10 Ethernet ports compliant with 10/100/1000BT • One channel can be used with an optical fiber SX or LX • 9 x 1000BT conduction cooled version • Main Layer 2 bridging capabilities • Non-blocking switch with full wire speed performance • 4K MAC addresses • Automatic learning and ageing • 802.1 Q support for 4K VLANs or port based VLAN, Flow control back pressure on half-duplex port and pause-frame on full duplex port • QoS with four traffic classes • Determined by port, IEEE802.1p tagged frames, IPV4's TOS & differentiated services, IPV6's traffic class, IEEE 802.1 Q VID, destination MAC or source MAC address • Fixed priority and programmable weighted fair queuing • MAC authentication compliant with IEEE 802.1X

SOFTWARE: OPERATING SYSTEM

BAE Systems

Website: www.baesystems.com

Model: CsLEOS OS

RSC No: 16048

A layered, embedded operating system, certifiable to the highest aviation industry reliability standards • Uses the industry-standard ARINC-653 application programming interface to implement brick-wall time and space partitioning • Fully documented for, and certifiable to DO-178B, Level A, for safety-of-life applications • Multiple channel synchronization • Fast restart (in-air) • Automatic fault logging • Guaranteed fault response • Multiple partition schedules • Flexible partition time slice • Safe shared memory access • Separately loadable applications • Shared library support • Supervisor partitions support • Configurable virtual memory support

VME NEW PRODUCTS

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